

USER SERVICE REQUIREMENTS

SMALL SYSTEMS

INPUT

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USER SERVICE REQUIREMENTS SMALL SYSTEMS

CONTENTS

		<u>Page</u>
I	INTRODUCTION.....	1
	A. Demographics	4
	B. Methodology	9
II	EXECUTIVE SUMMARY	11
	A. Small-System User Satisfaction with Overall Service-- Above Average Vendors	12
	B. Small-System User Satisfaction with Services--Below Average Vendors	14
	C. Small-System User Requirements for Services Are Not Satisfied	16
	D. Small-System Users Prioritizing Hardware Service Requirements	18
	E. Small-System User Systems Software Support Requirements Growing Rapidly	20
III	BURROUGHS.....	23
IV	DATA GENERAL	37
V	DATAPoint	51
VI	DEC.....	65
VII	FOUR-PHASE	79
VIII	HEWLETT-PACKARD	93
IX	HONEYWELL.....	107
X	IBM	121
XI	NCR	135
XII	PERKIN-ELMER	149
XIII	PRIME.....	163

	<u>Page</u>
APPENDIX A: ALL SMALL-SYSTEM VENDOR SERVICE PERFORMANCE ANALYSIS	177
APPENDIX B: SUPERMINICOMPUTER SERVICE PERFORMANCE ANALYSIS	187
APPENDIX C: TRADITIONAL MINICOMPUTER SERVICE PERFORMANCE DATA	193
APPENDIX D: USER QUESTIONNAIRE	199
APPENDIX E: DATA BASE FORMAT	205
A. Overview of the Data Base	205
B. Analysis of the Data Base Files	207
APPENDIX F: DEFINITIONS.....	209

USER SERVICE REQUIREMENTS SMALL SYSTEMS

EXHIBITS

		<u>Page</u>
I	-1 Small-System Interview Sample by Product	2
	-2 Title of Person Interviewed	5
	-3 Small-System User Sample by Industry Sector	6
	-4 Geographic Distribution of Small-System Respondents	7
	-5 Length of User's Services Relationship with Manufacturer and Current CPU Installed Age	8
II	-1 Small-System User Satisfaction with Overall Service-- Above Average Vendors	13
	-2 Small-System User Satisfaction with Overall Service-- Below Average Vendors	15
	-3 Small-System User Requirements for Services Are Not Satisfied	17
	-4 Small-System Users Prioritizing Hardware Services Requirements	19
	-5 Small-System User Systems Software Support Requirements Growing	21
III	-1 Service Performance and User Ratings Comparison, 1984-1985: Burroughs	24
	-2 Vendor Hardware Service Strengths and Weaknesses: Burroughs	25
	-3 Vendor Software Service Strengths and Weaknesses: Burroughs	26
	-4 1985 User Satisfaction with Hardware Service: Burroughs	28
	-5 1985 User Satisfaction with Systems Software Service: Burroughs	29
	-6 Burroughs Hardware Support: User Requirements versus Level of Service Received	30
	-7 Burroughs Systems Software Support: User Requirements versus Level of Service Received	31
	-8 Hardware Service Component Data: Burroughs	32
	-9 Systems Software Service Component Data: Burroughs	33
	-10 Small-System User Requirements for Extended Services: Burroughs	35

		<u>Page</u>
IV	-1 Service Performance and User Ratings Comparison, 1984-1985: Data General	38
	-2 Vendor Hardware Service Strengths and Weaknesses: Data General	39
	-3 Vendor Software Service Strengths and Weaknesses: Data General	40
	-4 1985 User Satisfaction with Hardware Service: Data General	42
	-5 1985 User Satisfaction with Systems Software Service: Data General	43
	-6 Data General Hardware Support: User Requirements versus Level of Service Received	44
	-7 Data General Systems Software Support: User Requirements versus Level of Service Received	45
	-8 Hardware Service Component Data: Data General	46
	-9 Systems Software Service Component Data: Data General	48
	-10 Small-System User Requirements for Extended Services: Data General	49
V	-1 Service Performance and User Ratings Comparison, 1984-1985: Datapoint	52
	-2 Vendor Hardware Service Strengths and Weaknesses: Datapoint	53
	-3 Vendor Software Service Strengths and Weaknesses: Datapoint	55
	-4 1985 User Satisfaction with Hardware Service: Datapoint	56
	-5 1985 User Satisfaction with Systems Software Service: Datapoint	57
	-6 Datapoint Hardware Support: User Requirements versus Level of Service Received	58
	-7 Datapoint Systems Software Support: User Requirements versus Level of Service Received	59
	-8 Hardware Service Component Data: Datapoint	60
	-9 Systems Software Service Component Data: Datapoint	62
	-10 Small-System User Requirements for Extended Services: Datapoint	63
VI	-1 Service Performance and User Ratings Comparison, 1984-1985: DEC	66
	-2 Vendor Hardware Service Strengths and Weaknesses: DEC	67
	-3 Vendor Software Service Strengths and Weaknesses: DEC	68
	-4 1985 User Satisfaction with Hardware Service: DEC	70
	-5 1985 User Satisfaction with Systems Software Service: DEC	71
	-6 DEC Hardware Support: User Requirements versus Level of Service Received	72

	-7	DEC Systems Software Support: User Requirements versus Level of Service Received	73
	-8	Hardware Service Component Data: DEC	74
	-9	Systems Software Service Component Data: DEC	76
	-10	Small-System User Requirements for Extended Services: DEC	77
VII	-1	Service Performance and User Ratings Comparison, 1984-1985: Four-Phase	80
	-2	Vendor Hardware Service Strengths and Weaknesses: Four-Phase	81
	-3	Vendor Software Service Strengths and Weaknesses: Four-Phase	82
	-4	1985 User Satisfaction with Hardware Service: Four-Phase	84
	-5	1985 User Satisfaction with Systems Software Service: Four-Phase	85
	-6	Four-Phase Hardware Support: User Requirements versus Level of Service Received	86
	-7	Four-Phase Systems Software Support: User Requirements versus Level of Service Received	87
	-8	Hardware Service Component Data: Four-Phase	88
	-9	Systems Software Service Component Data: Four-Phase	89
	-10	Small-System User Requirements for Extended Services: Four-Phase	91
VIII	-1	Service Performance and User Ratings Comparison, 1984-1985: Hewlett-Packard	94
	-2	Vendor Hardware Service Strengths and Weaknesses: Hewlett-Packard	95
	-3	Vendor Software Service Strengths and Weaknesses: Hewlett-Packard	96
	-4	1985 User Satisfaction with Hardware Service: Hewlett-Packard	97
	-5	1985 User Satisfaction with Systems Software Service: Hewlett-Packard	98
	-6	Hewlett-Packard Hardware Support: User Requirements versus Level of Service Received	100
	-7	Hewlett-Packard Systems Software Support: User Requirements versus Level of Service Received	101
	-8	Hardware Service Component Data: Hewlett-Packard	102
	-9	Systems Software Service Component Data: Hewlett-Packard	104
	-10	Small-System User Requirements for Extended Services: Hewlett-Packard	105
IX	-1	Service Performance and User Ratings Comparison, 1984-1985: Honeywell	108
	-2	Vendor Hardware Service Strengths and Weaknesses: Honeywell	109

		<u>Page</u>
	-3 Vendor Software Service Strengths and Weaknesses: Honeywell	110
	-4 1985 User Satisfaction with Hardware Service: Honeywell	112
	-5 1985 User Satisfaction with Systems Software Service: Honeywell	113
	-6 Honeywell Hardware Support: User Requirements versus Level of Service Received	114
	-7 Honeywell Systems Software Support: User Requirements versus Level of Service Received	115
	-8 Hardware Service Component Data: Honeywell	117
	-9 Systems Software Service Component Data: Honeywell	118
	-10 Small-System User Requirements for Extended Services: Honeywell	119
X	-1 Service Performance and User Ratings Comparison, 1984-1985: IBM	122
	-2 Vendor Hardware Service Strengths and Weaknesses: IBM	123
	-3 Vendor Software Service Strengths and Weaknesses: IBM	124
	-4 1985 User Satisfaction with Hardware Service: IBM	126
	-5 1985 User Satisfaction with Systems Software Service: IBM	127
	-6 IBM Hardware Support: User Requirements versus Level of Service Received	128
	-7 IBM Systems Software Support: User Requirements versus Level of Service Received	129
	-8 Hardware Service Component Data: IBM	130
	-9 Systems Software Service Component Data: IBM	132
	-10 Small-System User Requirements for Extended Services: IBM	133
XI	-1 Service Performance and User Ratings Comparison, 1984-1985: NCR	136
	-2 Vendor Hardware Service Strengths and Weaknesses: NCR	137
	-3 Vendor Software Service Strengths and Weaknesses: NCR	139
	-4 1985 User Satisfaction with Hardware Service: NCR	140
	-5 1985 User Satisfaction with Systems Software Service: NCR	141
	-6 NCR Hardware Support: User Requirements versus Level of Service Received	142
	-7 NCR Systems Software Support: User Requirements versus Level of Service Received	143
	-8 Hardware Service Component Data: NCR	145
	-9 Systems Software Service Component Data: NCR	146
	-10 Small-System User Requirements for Extended Services: NCR	147

XII	-1	Service Performance and User Ratings Comparison, 1984-1985: Perkin-Elmer	150
	-2	Vendor Hardware Service Strengths and Weaknesses: Perkin-Elmer	152
	-3	Vendor Software Service Strengths and Weaknesses: Perkin-Elmer	153
	-4	1985 User Satisfaction with Hardware Service: Perkin-Elmer	154
	-5	1985 User Satisfaction with Systems Software Service: Perkin-Elmer	155
	-6	Perkin-Elmer Hardware Support: User Requirements versus Level of Service Received	156
	-7	Perkin-Elmer Systems Software Support: User Requirements versus Level of Service Received	157
	-8	Hardware Service Component Data: Perkin-Elmer	159
	-9	Systems Software Service Component Data: Perkin-Elmer	160
	-10	Small-System User Requirements for Extended Services: Perkin-Elmer	161
XIII	-1	Service Performance and User Ratings Comparison, 1984-1985: Prime	164
	-2	Vendor Hardware Service Strengths and Weaknesses: Prime	165
	-3	Vendor Software Service Strengths and Weaknesses: Prime	166
	-4	1985 User Satisfaction with Hardware Service: Prime	167
	-5	1985 User Satisfaction with Systems Software Service: Prime	168
	-6	Prime Hardware Support: User Requirements versus Level of Service Received	170
	-7	Prime Systems Software Support: User Requirements versus Level of Service Received	171
	-8	Hardware Service Component Data: Prime	172
	-9	Systems Software Service Component Data: Prime	174
	-10	Small-System User Requirements for Extended Services: Prime	175
A	-1	Service Performance and User Ratings Comparison, 1984-1985: All Small-System Vendors	177
	-2	Vendor Hardware Service Strengths and Weaknesses: All Small-System Vendors	178
	-3	Vendor Software Service Strengths and Weaknesses: All Small-System Vendors	179
	-4	1985 User Satisfaction with Hardware Service: All Small-System Vendors	180
	-5	1985 User Satisfaction with Systems Software Service: All Small-System Vendors	181

		<u>Page</u>
	-6 All Small-System Vendors Hardware Support: User Requirements versus Level of Service Received	182
	-7 All Small-Systems Vendors Systems Software Support: User Requirements versus Level of Service Received	183
	-8 Hardware Service Component Data: All Small-System Vendors	184
	-9 Systems Software Service Component Data: All Small-System Vendors	185
	-10 Small-System User Requirements for Extended Services: All Small-System Vendors	186
B	-1 User Satisfaction with Service: Superminicomputer Vendors	188
	-2 System Availability and System Interruption: Superminicomputer Vendors	189
	-3 System Interruptions by Cause: Superminicomputer Vendors	190
	-4 Hardware Response and Repair Time: Superminicomputer Vendors	191
	-5 Systems Software Response and Repair Time: Superminicomputer Vendors	192
C	-1 User Satisfaction with Service: Minicomputer Vendors	194
	-2 System Availability and System Interruptions: Minicomputer Vendors	195
	-3 System Interruptions by Cause: Minicomputer Vendors	196
	-4 Hardware Response and Repair Time: Minicomputer Vendors	197
	-5 Systems Software Response and Repair Time: Minicomputer Vendors	198

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I INTRODUCTION

I INTRODUCTION

- This report on user requirements for small-system hardware and system software service has been produced by INPUT as part of the 1985 Customer Service Program (Small-System Module) for the United States and for clients of that program.
- As with office products and large computer systems, the small-system service market segment can be differentiated by user requirements for service and by the level of service provided by system vendors. Small-system users typically have a lower or less pressing requirement for service than users of the more costly mainframes. However, small-system users are becoming much more sophisticated in defining their service needs, and this sophistication sets them apart from the typical office product user.
- Small systems, for the purposes of this report, include traditional, multiuser, and 16-bit minicomputers, as well as the more advanced 32-bit supermini-computers. Exhibit I-1 lists products surveyed for this report.
- Exhibit I-1 demonstrates that a total of 372 user interviews were conducted on 22 small-system CPUs produced by the 11 major vendors in this market. Because of the preponderance of multivendor user sites, this report emphasizes the performance and service of the CPUs alone, which are listed in Exhibit I-1. Additional data on peripheral services (particularly disk drive and printer support) will be forthcoming in a separate data report which will provide a comprehensive analysis of the small-system user service requirements for peripheral devices.

EXHIBIT I-1

SMALL-SYSTEM INTERVIEW SAMPLE BY PRODUCT

Total Interviews: 372			
Burroughs		Honeywell	
B19XX	26	DPS /6	<u>20</u>
B9XX	4	Total	20
B9X	<u>2</u>		
Total	32		
Datapoint		IBM	
86XX	13	Series 1	20
88XX	<u>4</u>	System 36	20
Total	17	System 38	<u>24</u>
		Total	64
DEC		NCR	
VAX 11/750, 780	29	9100	20
PDP11/70	<u>20</u>	9300	<u>21</u>
Total	49	Total	41
Data General		Perkin Elmer	
MV Series	20	32XX	<u>18</u>
Nova	11	Total	18
Eclipse	<u>14</u>		
Total	45		
Four Phase		Prime	
IV/40 - IV/90	<u>21</u>	750	4
Total	21	850	7
		2250	7
Hewlett-Packard		9950	<u>2</u>
3000	<u>25</u>	Total	20
Total	25		
		Other	
		20	

- AT&T user responses make up the majority of "other" interviews listed in Exhibit I-I. However, AT&T data was not analyzed separately in this report for two primary reasons:
 - The relatively small installed base made a statistically valid analysis questionable.
 - AT&T users reported an average CPU installed age of just under seven months. INPUT believes that this short amount of time is inadequate to accurately evaluate a service vendor's performance.
- INPUT recognizes that some vendors, such as IBM and Data General, participate in a number of different product and service markets including both minicomputer and superminicomputer. For this reason, INPUT has broken out selected service performance data into both product and vendor categories in Appendices B and C. While the majority of the data in the report analyzes the small-system vendor's overall performance, Appendix D examines supermini-computer service performance, and Appendix C explores the traditional minicomputer service market.
- Readers who are familiar with earlier INPUT reports on customer service will notice a much greater emphasis on individual vendor performance in this report. In addition, INPUT has substantially increased the amount of operating system support data in 1985. This new emphasis reflects the changing service marketplace in which software and professional services will become increasingly important to each vendor's installed base.
- Small-system user attitudes about pricing of service and third-party maintenance are also important topics but are described only briefly in this report. Much more extensive analysis of these important service issues will be presented in reports entitled Customer Service Pricing Analysis and User Receptivity to Third-Party Maintenance.

A. DEMOGRAPHICS

- The basis of this report is an interview sample of 372 small-system users. These users were surveyed by telephone between February and April 1985. The average interview lasted 25 to 35 minutes. A copy of the questionnaire used in this survey is included in Appendix D.
- In order to get a representative sample of small-system user responses, INPUT made a concerted effort to distribute initial contact throughout a variety of geographic areas and industries. In all cases, INPUT's trained interviewers were instructed to interview only those persons who possessed "hands-on" knowledge of the system and had a broad overview of total service requirements. In most cases (54%), this individual was the data processing manager. Exhibit I-2 lists the person interviewed by position title.
- Exhibits I-3 and I-4 provide a demographic breakdown by industry sector (Exhibit I-3) and geographic distribution (Exhibit I-4). Exhibit I-3 demonstrates that almost 40% of all small-system user respondents are involved in discrete or process manufacturing, reflecting the high level of small-system penetration in these industries. Similarly, industries such as banking and insurance are not well represented because of their historic dependence on mainframe systems.
- The average age of the respondents' CPU and the length of the service relationship between vendor and respondent is demonstrated in Exhibit I-5. This exhibit is crucial for analyzing the data throughout this report, particularly because service technology depends on the installed age of the CPU. The newer the design of the CPU, the more likely the vendor was to incorporate advanced service technology such as remote diagnostics, self-monitoring routines, and modular design. This technology has, in some cases, made a significant impact on user perceptions of service.

EXHIBIT I-2

TITLE OF PERSON INTERVIEWED

TITLE	NUMBER OF INTERVIEWS
Vice President/V.P. Data Processing	12
Director of the Computer Center/I.S. Director	21
Data Processing Manager/Department Manager	200
Operations Manager	23
Supervisor	51
Other (e.g., President, Treasurer)	65
Total Interviews	372

EXHIBIT I-3

SMALL-SYSTEM USER SAMPLE BY INDUSTRY SECTOR

SECTOR	NUMBER OF USER INTERVIEWS
Banking	9
Distribution (Wholesale/Retail)	36
Education	23
Government - Federal	12
Government - State & Local	18
Insurance	14
Manufacturing - Discrete	75
Manufacturing - Process	64
Medical	21
Services	58
Transportation	8
Utilities	12
Other	22
Total Interviews	372

EXHIBIT I-4

GEOGRAPHIC DISTRIBUTION OF
SMALL-SYSTEM RESPONDENTS

REGION	NUMBER OF RESPONDENTS
Northeast (ME, VT, NH, MA, NY, RI, CT, NJ, PA)	49
Southeast (DE, MD, DC, WV, VA, KY, NC, SC, TN, GA, FL, AL, MS, LA)	74
North Central (WI, MI, IL, IN, OH)	64
Midwest (MN, ND, SD, IA, KS, MO, OK, AR, TX, NE)	73
Mountain (MT, ID, WY, NV, UT, CO, AZ, NM)	40
Pacific (WA, OR, CA, HI, AK)	72
Total Number of Respondents	372

EXHIBIT 1-5

LENGTH OF USER'S SERVICE RELATIONSHIP WITH MANUFACTURER AND CURRENT CPU INSTALLED AGE

SMALL SYSTEM VENDOR	LENGTH OF SERVICE RELATIONSHIP* (Years)	CPU INSTALLED AGE (Years)
All Vendors	5.8	2.9
Burroughs	7.0	3.2
Data General	5.3	3.5
Datapoint	6.5	2.3
DEC	6.0	4.3
Four-Phase	4.4	4.4
Hewlett-Packard	5.4	3.1
Honeywell	8.4	3.2
IBM	9.8	2.7
NCR	2.8	0.8
Perkin-Elmer	4.0	3.7
Prime	4.0	2.6

*Average standard error 0.3 years

†Average standard error 0.1 years

B. METHODOLOGY

- As noted above, the questionnaire listed in Appendix D was used as the basis of this report. Potential respondents were selected from a variety of lists including:
 - User lists provided by INPUT clients.
 - Publicly available subscription sources.
 - INPUT hard copy files.
 - INPUT data base listings.
- All respondents were assured that their responses would remain completely confidential. The data provided here cannot be linked to any individual or company respondent.
- Once the interview was completed, the data was entered into an IBM PC (PC-DOS version 2.0) using dBASE III, a relational data base management system produced by Ashton Tate and analyzed using a statistical analysis program entitled ABSTAT. Information about both of these programs, along with additional information about the small-system user data base are included in Appendix E.
- Appendix F includes definitions of key service-related terms which are used in this report.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This Executive Summary is designed to help the busy reader quickly review the research findings of this report without having to read each chapter, while at the same time ensuring that key points are not missed. Each main point is summarized as an exhibit and an accompanying script is given on the opposite page.
- This report identifies and qualifies small-system user requirements for service.
- The small-system service market is changing dramatically as a result of two important factors. First, new, much more powerful products are being introduced on an increasingly rapid basis. This equipment frequently has many of the latest advances in service technology designed to improve uptime and serviceability of the machine and lower service costs for the manufacturer.
- The second major factor which is changing the small-system service market is the penetration by small-system vendors into non-traditional markets such as office automation. This penetration has resulted in expanded growth for such vendors as Wang, IBM, DEC, and HP. However, this growth has also resulted in higher demand for service by users.
- This report finds a consistent pattern of increased user expectations for service. In some cases, such as with parts availability, demand for service is quite pressing. In other cases, as with the need for improved planning services, the need is not so pressing.

A. SMALL-SYSTEM USER SATISFACTION WITH OVERALL SERVICE—
ABOVE AVERAGE VENDORS

- Despite a relatively high level of user dissatisfaction with individual components of service, the users' overall rating of service is quite high, as demonstrated in Exhibits II-1 and II-2.
- NCR achieved the highest overall user satisfaction rating of all small-system vendors, primarily as a result of vastly improved system availability and lower hardware response/repair time. The Dayton (OH) company was rated at 8.6 (1 = low, 10 = high) by its users, compared to the average for all small-system vendors of 8.0.
- IBM and Hewlett-Packard received the highest ranking in 1984 and continue to deliver above average service. IBM users rated hardware service particularly good, but were not totally satisfied with system software support. HP users are among the most satisfied with service, but high expectations for service have lowered overall user ratings of the Palo Alto (CA) company.
- Burroughs improved its position significantly in 1985 as a result of improved software support and professional services, such as consulting and planning. Despite numerous improvements, resulting in higher overall satisfaction levels, Burroughs continues to have a problem with small-system parts availability and a low (perceived) skill level of field engineers.
- DEC users reported some gains in service, particularly in hardware maintenance, and received very high ratings for professional services, such as consulting and training. Software support, particularly software documentation and escalation procedures, prevented the users' rating from becoming even higher in 1985.

EXHIBIT II-1

SMALL-SYSTEM USER SATISFACTION WITH
OVERALL SERVICE - ABOVE AVERAGE VENDORS

RANK	VENDOR	PERCENT RATING ABOVE INDUSTRY AVERAGE
1	NCR	+8%
2	IBM	+5
3 (equal)	Hewlett-Packard/ Burroughs	+4
5	DEC	=

**B. SMALL-SYSTEM USER SATISFACTION WITH SERVICES—BELOW
AVERAGE VENDORS**

- While most of the vendors listed in Exhibit II-2 improved service in 1985, overall user satisfaction ratings fell below average because user expectations increased at such a rapid rate. Prime, for example, improved software service by 34% and still had a low satisfaction rating because user expectation for service increased by 42%.
- The 32-bit superminicomputer vendors, e.g., Perkin Elmer, have become particularly susceptible to increasing user expectations for service as they move into nontechnical markets such as office automation. The demand for systems software support has been increasing very quickly from these user groups, especially as complexity of the equipment and software has grown.
- Data General users indicated that their overall satisfaction with service was influenced primarily by lack of software support. Improvements in system availability, average number of interruptions, and total response time could not affect dissatisfaction rates of over 60% with software support.
- User satisfaction with Honeywell service has improved measurably in 1985, primarily as a result of gains made in hardware support and software professional services (such as software training and consulting). Datapoint user satisfaction, on the other hand, declined because of problems with hardware support. Users reported a greater number of hardware interruptions in 1985 than 1984 and average repair time increased substantially.
- AT&T service rates considerably below user expectations, but this is to be expected in the first year of commercial service operations. High priority services are parts availability, support and training of engineers, and software documentation.

EXHIBIT II-2

SMALL-SYSTEM USER SATISFACTION WITH OVERALL SERVICE - BELOW AVERAGE VENDORS

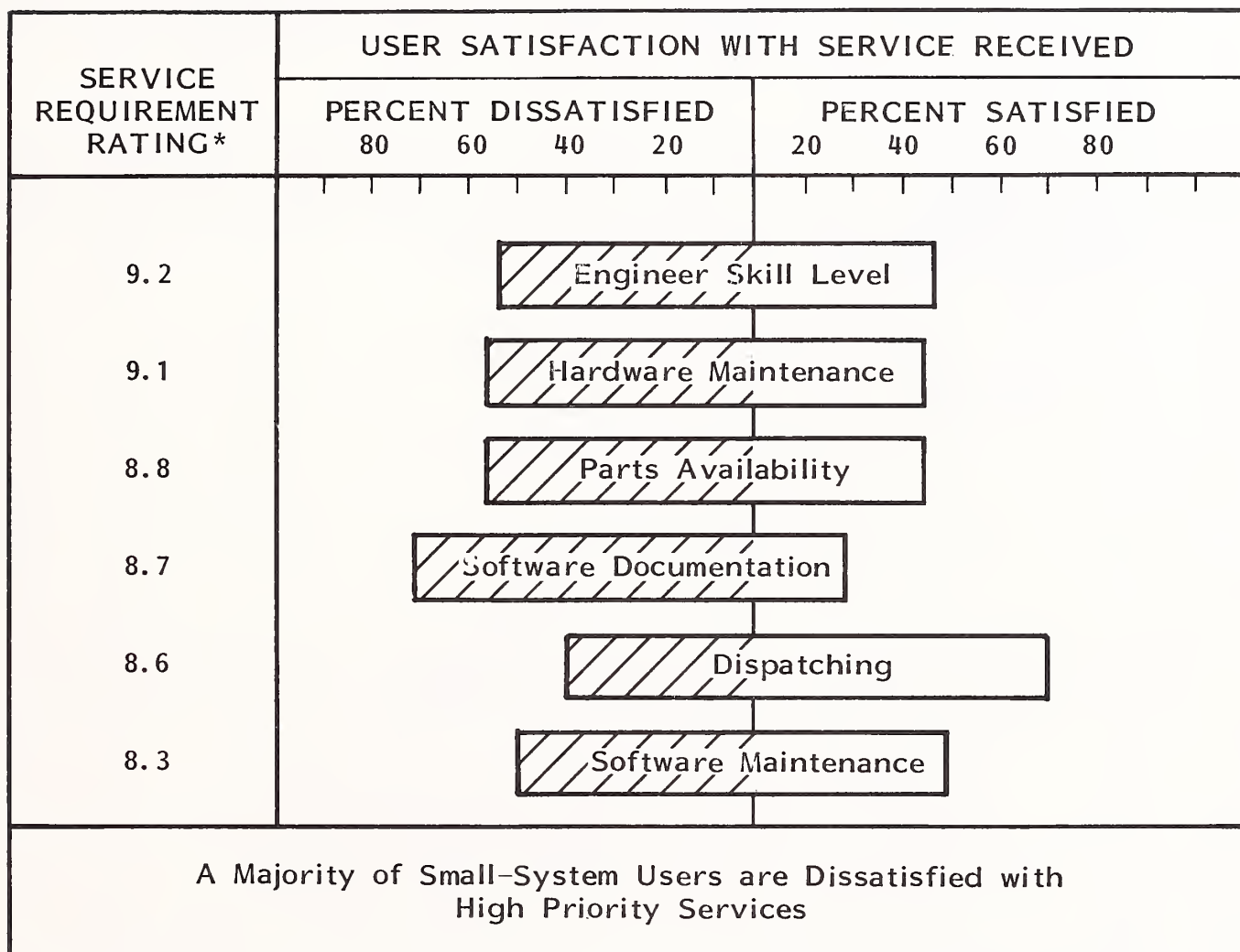
RANK	VENDOR	PERCENT RATING BELOW INDUSTRY AVERAGE
6 (equal)	Prime/ Data General	-1%
8	IV Phase	-4
9	Honeywell	-5
10	Datapoint	-6
11	Perkin Elmer	-7

C. SMALL-SYSTEM USER REQUIREMENTS FOR SERVICES ARE NOT SATISFIED

- Overall user satisfaction with service is typically based on a number of specific services which can, and usually do, vary by vendor product and user group. There are, however, a number of high priority services which consistently show up when users are evaluating vendor performance. Exhibit II-3 lists the six top services based on user requirements.
- Exhibit II-3 demonstrates that vendor performance for high requirement services, such as engineer skill level and overall hardware maintenance, typically does not measure up to user expectations for service, resulting in a high level of user dissatisfaction with service.
- On the other hand, small-system vendors are "overachieving" in low priority services, such as training. Users rate their own requirements for these services at 20% to 30% lower in importance than the high priority services listed in Exhibit II-3. In addition, users are quite satisfied with the support they are receiving in these low priority areas. Well over 60% of small-system users are satisfied with such services as planning, consulting, and training.
- User satisfaction with software support is declining rapidly as user expectations for service have increased substantially over the past several years. Less than one-third of all small-system users are satisfied with software documentation, and a majority of users are dissatisfied with all software services except consulting. The rate of dissatisfaction will accelerate unless vendors can keep up with increasing expectations.

EXHIBIT II-3

SMALL-SYSTEM USER REQUIREMENTS FOR SERVICES ARE NOT SATISFIED



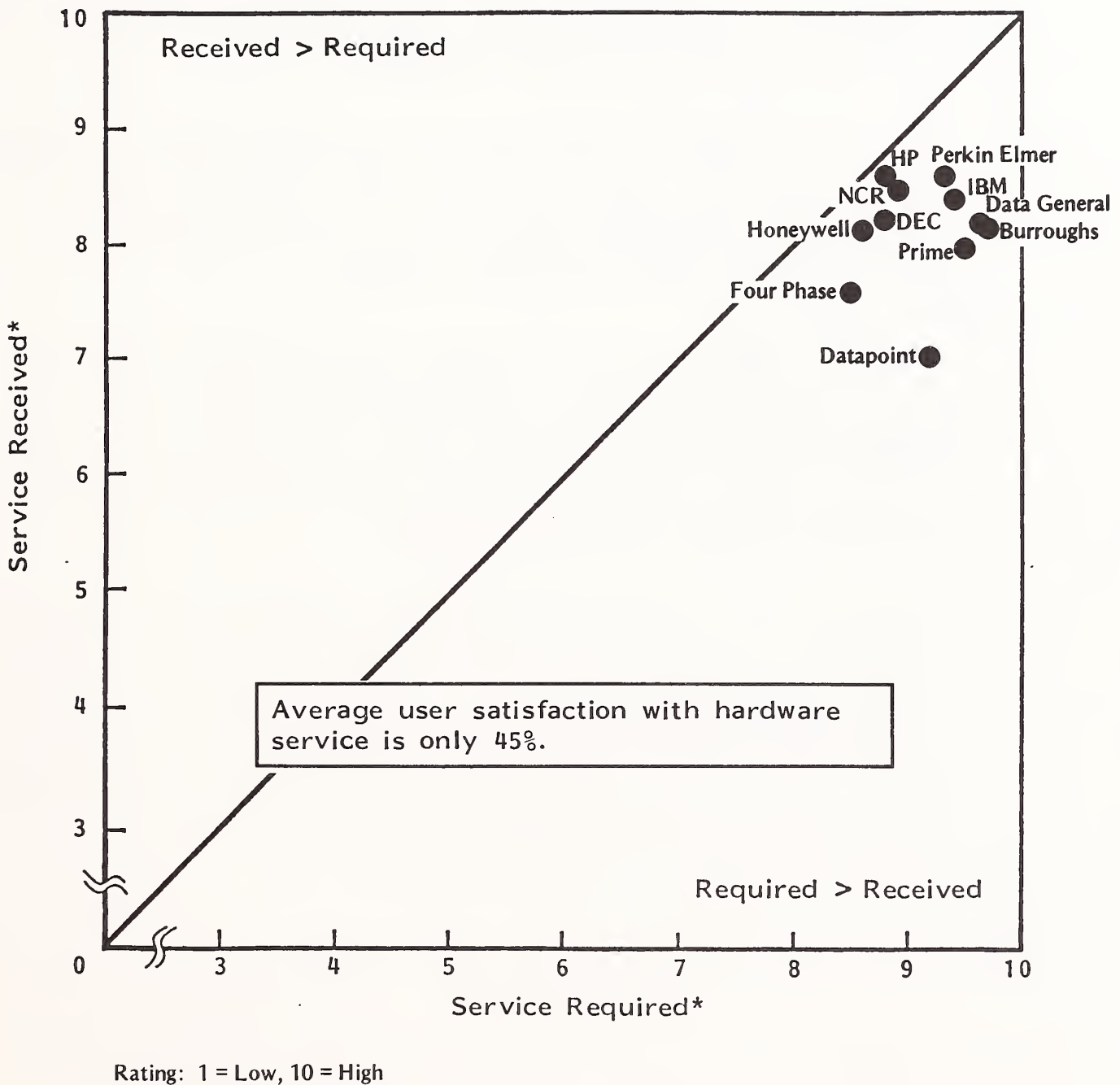
* Rating: 1 = Low, 10 = High

D. SMALL-SYSTEM USERS PRIORITIZING HARDWARE SERVICE REQUIREMENTS

- Hardware support requirements continue to influence user satisfaction rates more than any other service component, and small-system user expectations for hardware service are growing. Exhibit II-4 demonstrates that not one small-system vendor exceeds user expectations for service, resulting in an average satisfaction rating of just 45%.
- Small-system users have definitely prioritized their hardware service requirements, and the most successful vendors focus on high priority services. These high priority services include:
 - Support and training of the field engineer.
 - Parts availability and logistics operations.
 - Dispatching/escalation.
- Secondary hardware services, though still important to the small-system user, typically rate much lower on the users' priority list. These services include:
 - Hardware documentation (both reference and education).
 - Planning (installation, environment, and capacity).
 - Consulting.
- A number of small-system vendors have succeeded in increasing user perception of importance of selected lower priority services, such as consulting and documentation. This has had a very positive effect on user satisfaction with service.

EXHIBIT II-4

SMALL-SYSTEM USERS PRIORITIZING HARDWARE SERVICES REQUIREMENTS

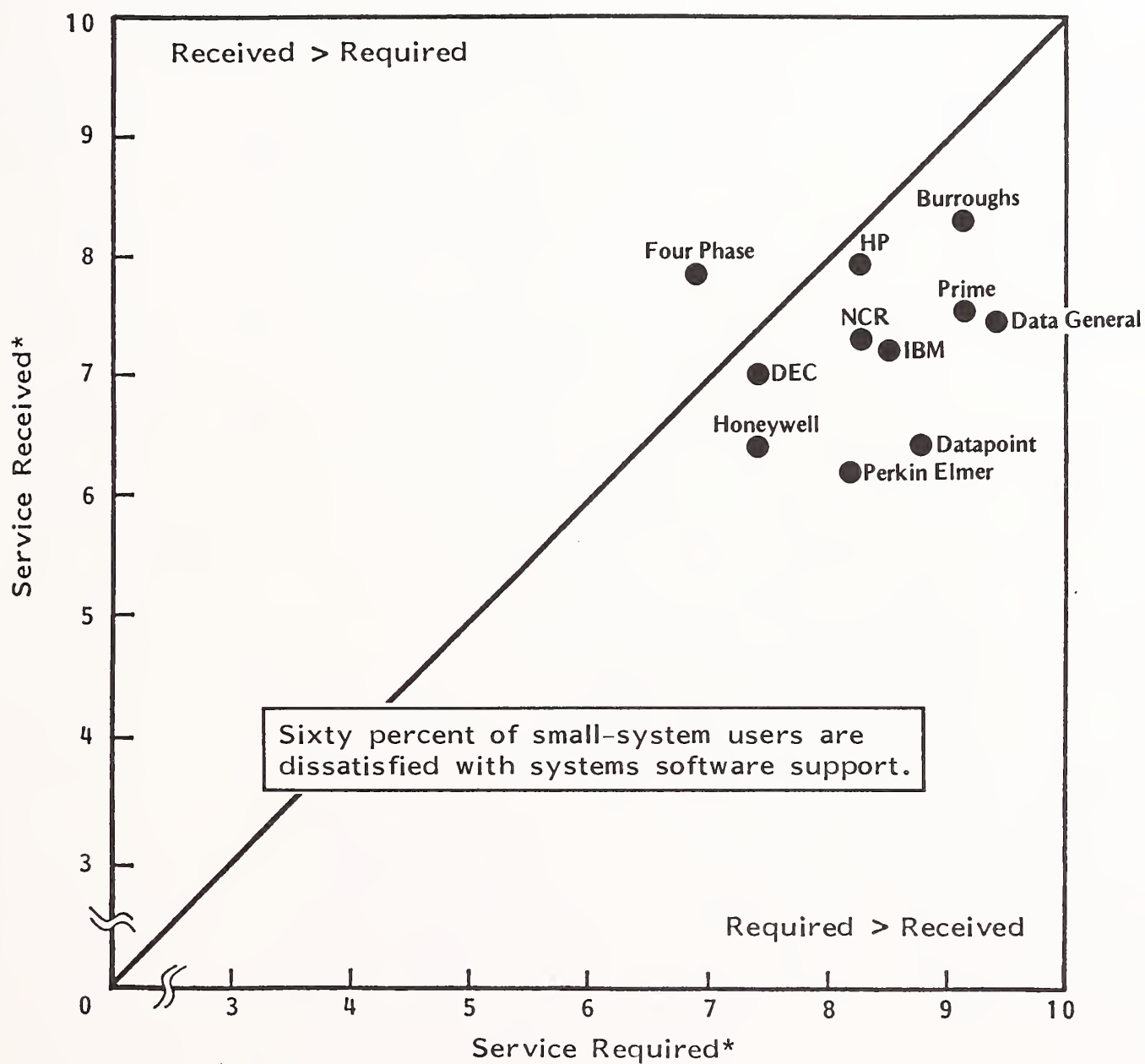


E. SMALL-SYSTEM USER SYSTEMS SOFTWARE SUPPORT REQUIREMENTS
GROWING RAPIDLY

- The vast majority of small-system users are dissatisfied with both the quality and quantity of systems software support they are receiving from their vendor. As Exhibit II-5 demonstrates, only one vendor--Four-Phase--exceeds user expectations for software service. Other small-system vendors fall far short of user requirements for software service.
- Software documentation is a key problem area for every vendor. Less than 30% of small-system users are satisfied with the documentation they currently receive, although this software service component is the single most important software service requirement users have.
- Small-system users are also very dissatisfied with the support and skill level of the vendor's software engineers. This dissatisfaction may be influenced by the remote nature of software support. Users are familiar and comfortable with on-site hardware support, but remote support for software reduces the level of communication and engineer visibility.
- Dissatisfaction with vendor-supplied systems software support has led, not surprisingly, to increased user interest in self-maintenance of software products. HP and Prime equipment users believe that this is almost a necessity. But some users prefer not to get involved in self-maintenance of software. Most users are willing to participate in software support if (and it is a large if) the vendor will provide software maintenance discounts.

EXHIBIT II-5

SMALL-SYSTEM USER SYSTEMS SOFTWARE SUPPORT REQUIREMENTS GROWING



Rating: 1 = Low, 10 = High.

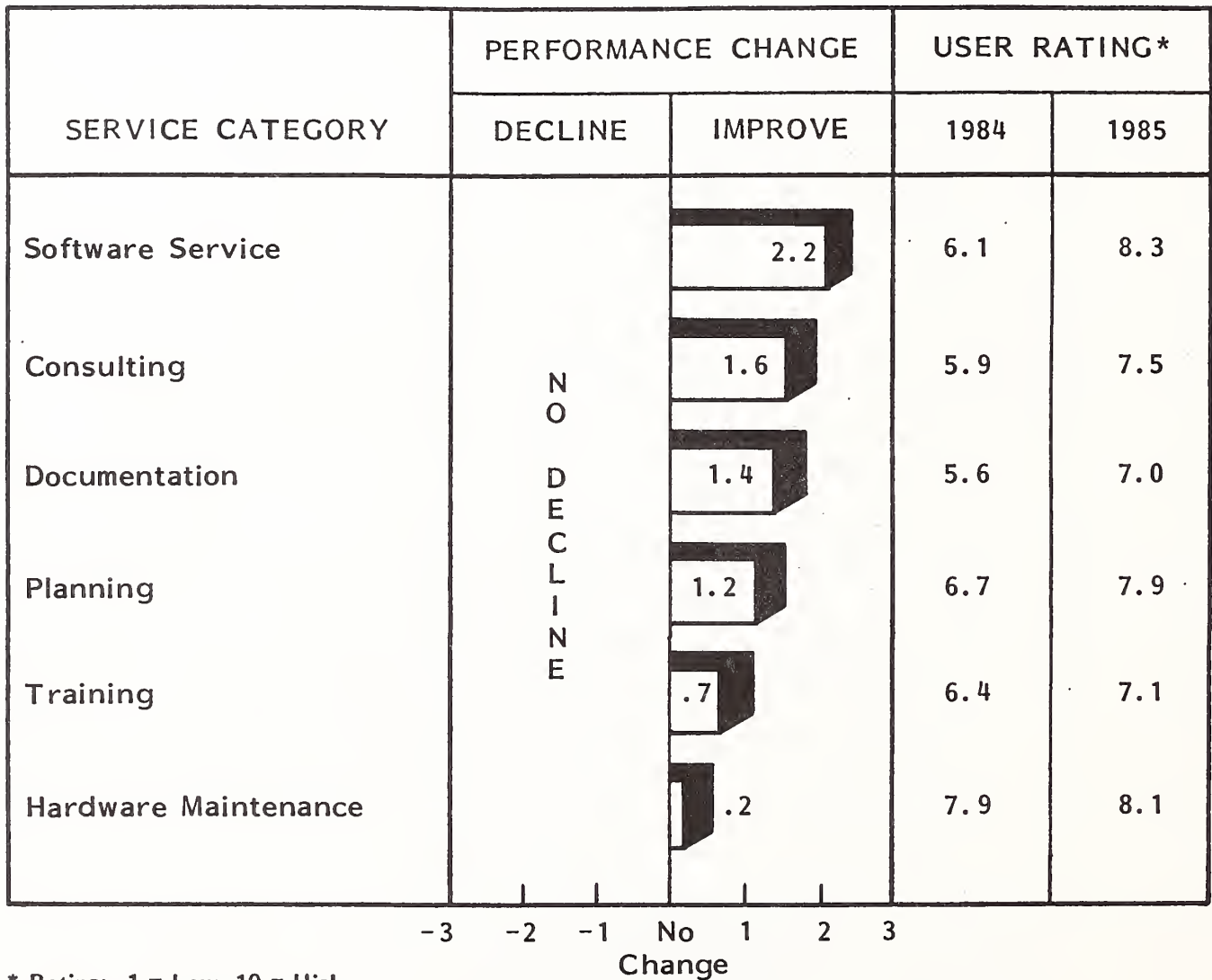
III BURROUGHS

III BURROUGHS

- Users of small systems from Burroughs (including the B1900, B900, and B90 series) reported significant improvements in service in 1985. Although the company does not meet all user expectations for service, user ratings of service are quite high.
- Improvements in service, particularly systems software and professional services, are demonstrated in Exhibit III-1. Not only did user ratings improve in every category, but Burroughs users now report significantly better than average service, while in 1984 the company's small-system service was rated at much worse than average.
- Major gains made in the non-hardware related aspect of service resulted in the turnaround. As Exhibit III-2 shows, overall hardware maintenance fell short of user expectations by 1.6 points (on a scale of 1-10). Parts availability is the chief culprit here. As Burroughs (and many other small-system vendors) attempts to reduce service expenditures, local and regional service offices are pressured to reduce inventories. Users perceive this shift in priorities, which has had a significant impact on service ratings.
- Although users are disappointed with some aspects of hardware support, improvements in software maintenance have not gone unmentioned. Exhibit III-3 shows that in crucial areas such as software engineer skill level and consulting, Burroughs performs beyond user expectations. Documentation is, in INPUT's view, the one major software area that the company must improve in order to keep user ratings high.

EXHIBIT III-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: BURROUGHS



* Rating: 1 = Low, 10 = High

EXHIBIT III-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: BURROUGHS

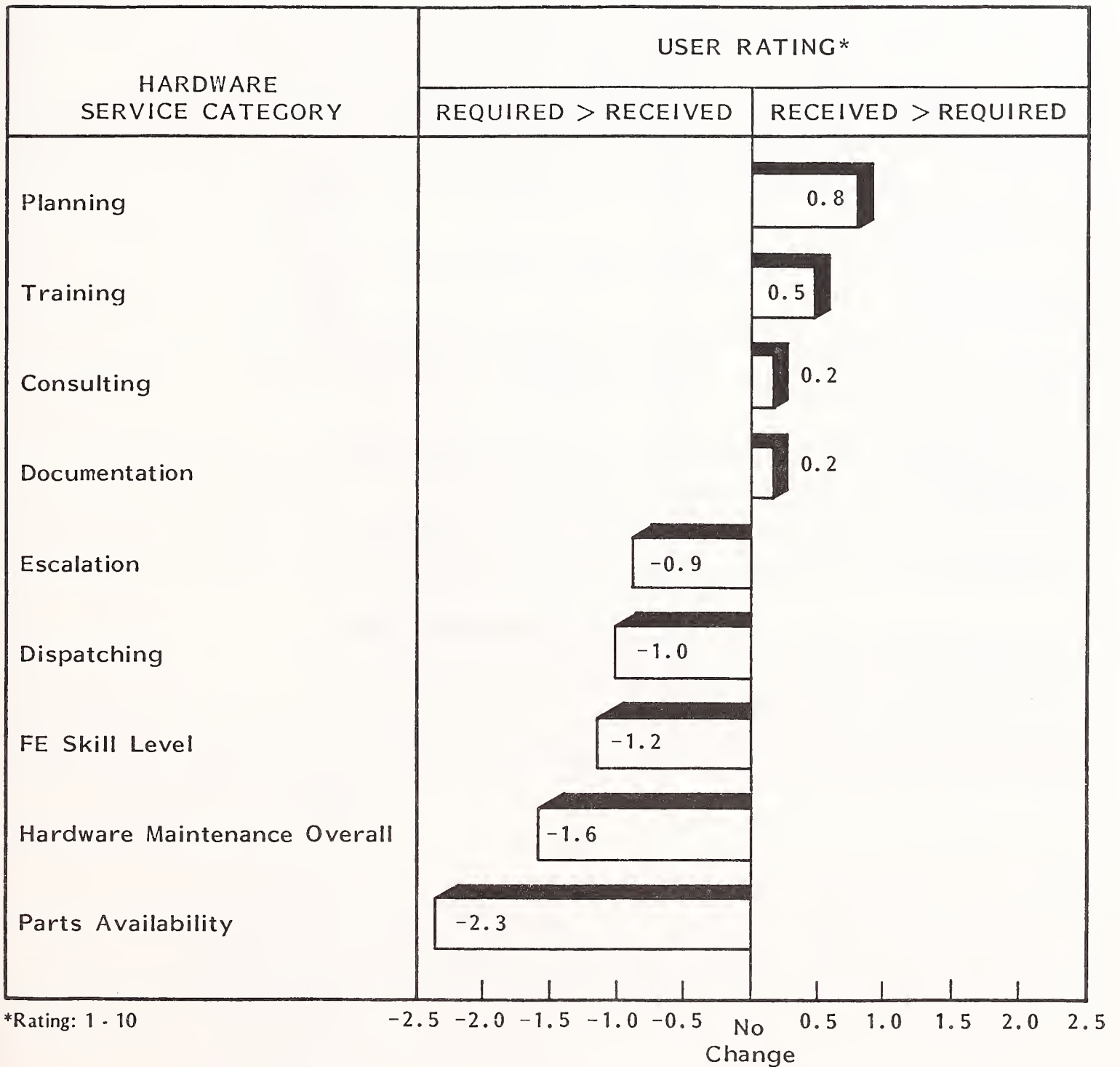
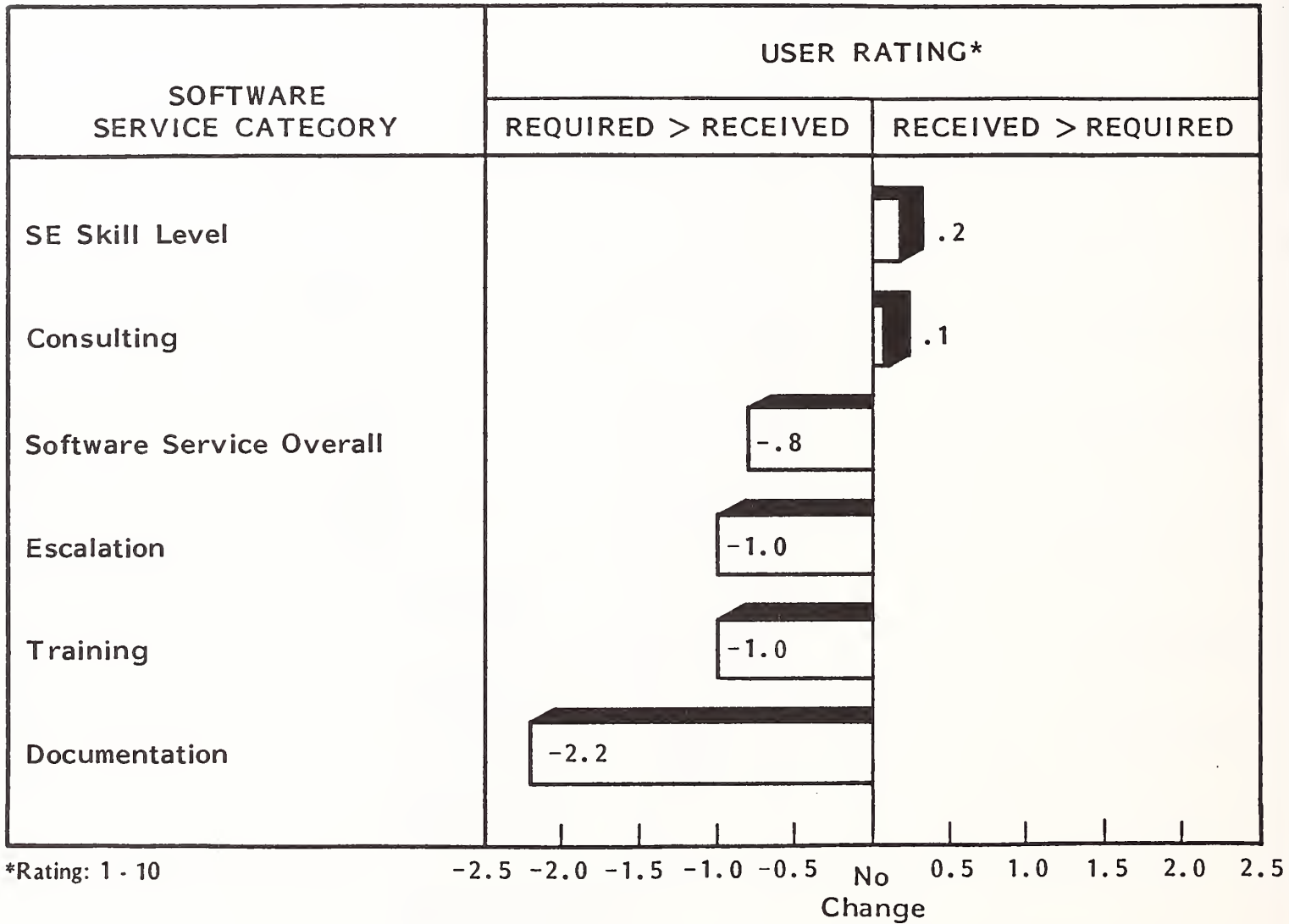


EXHIBIT III-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: BURROUGHS




- Satisfaction rates with hardware service, listed in Exhibit III-4, rank poorly for the most important services. User perception of poor parts availability is the central cause of this dissatisfaction. Users primarily rate the FE's skill level according to whether the machine is repaired or not, and repair is impacted by parts availability.
- Software maintenance satisfaction (Exhibit III-5) shows a pattern similar to that of hardware maintenance. One key service component, in this case software documentation, colors user evaluations of all other services.
- Improved software documentation is crucial for two major reasons:
 - It will reduce the number of problem calls resulting from user errors.
 - It will satisfy the 37.5% of Burroughs small-system users who say they want to participate in software support.
- Exhibits III-6 and III-7 graphically depict the intersection of hardware and software service required by Burroughs users and the level of service actually provided by the company. The exhibits show that the higher the user requirement for service, the less likely Burroughs is to meet the user expectation.
- The company must integrate user perceptions about all services in order to prevent the type of user prioritization shown in Exhibit III-6. Users must perceive the value of all services, or overall satisfaction rates will be too dependent on just one or two services (such as parts availability or software documentation).
- It is understandable that user ratings of Burroughs service have improved considering the actual service performance data in Exhibits III-8 and III-9. Burroughs hardware service performance is better than average in every service category. More important, results have improved dramatically;

EXHIBIT III-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
BURROUGHS

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
FE Skill Level	9.7	8.5	29.0%
Hardware Maintenance Overall	9.7	8.1	29.0
Parts Availability	9.4	7.1	29.0
Dispatching	9.1	8.1	46.7
Escalation	8.7	7.8	46.7
Consulting	7.3	7.5	56.0
Planning	7.1	7.9	68.2
Documentation	6.8	7.0	51.9
Training	6.6	7.1	56.5


 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT III-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: BURROUGHS

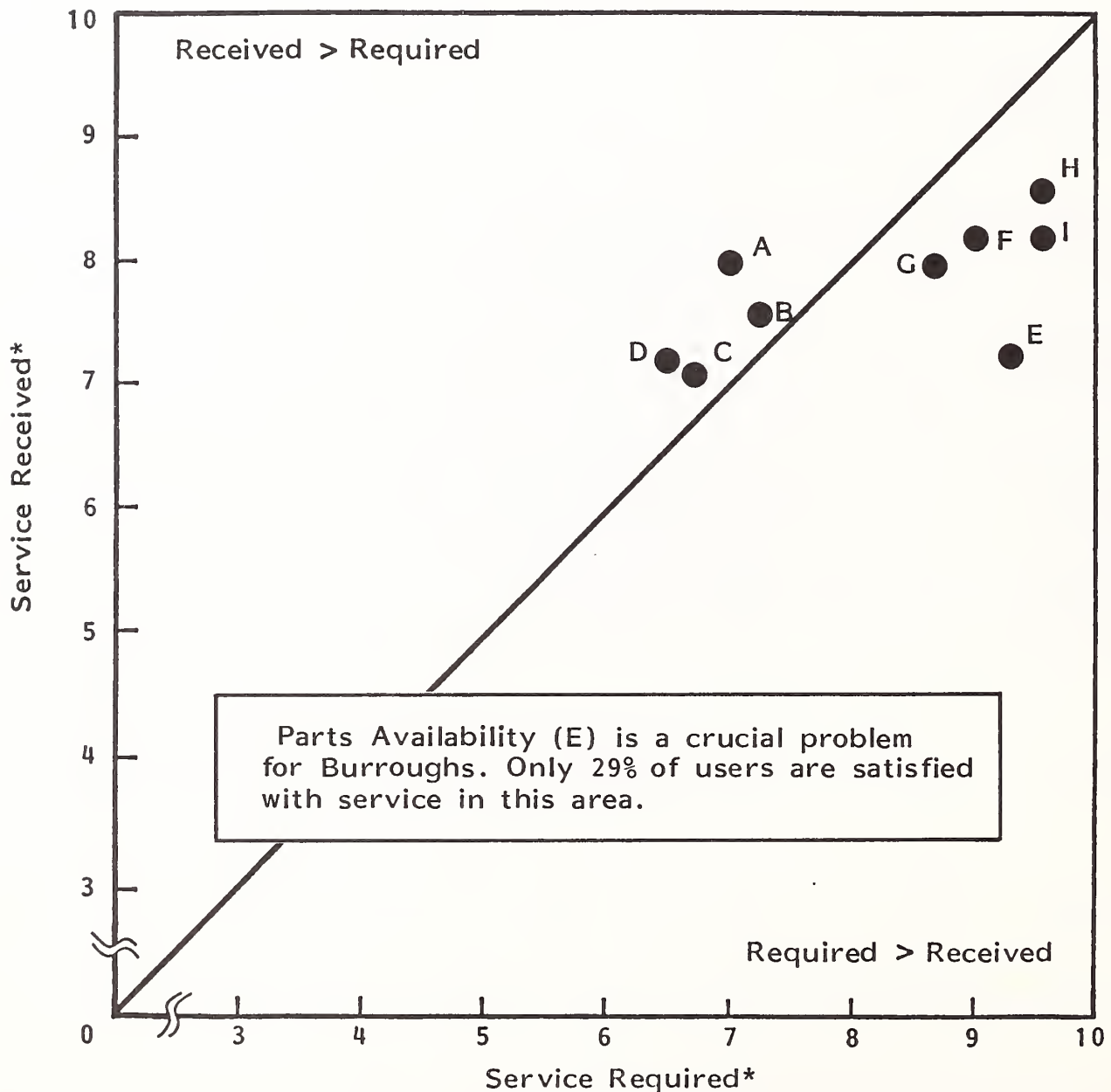
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Software Service Overall	9.1	8.3	33.3%
Documentation	9.1	6.9	13.3
Escalation	8.9	7.9	41.2
SE Skill Level	8.3	8.5	63.2
Training	8.2	7.2	40.0
Consulting	7.7	7.8	59.1

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT III-6

BURROUGHS HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

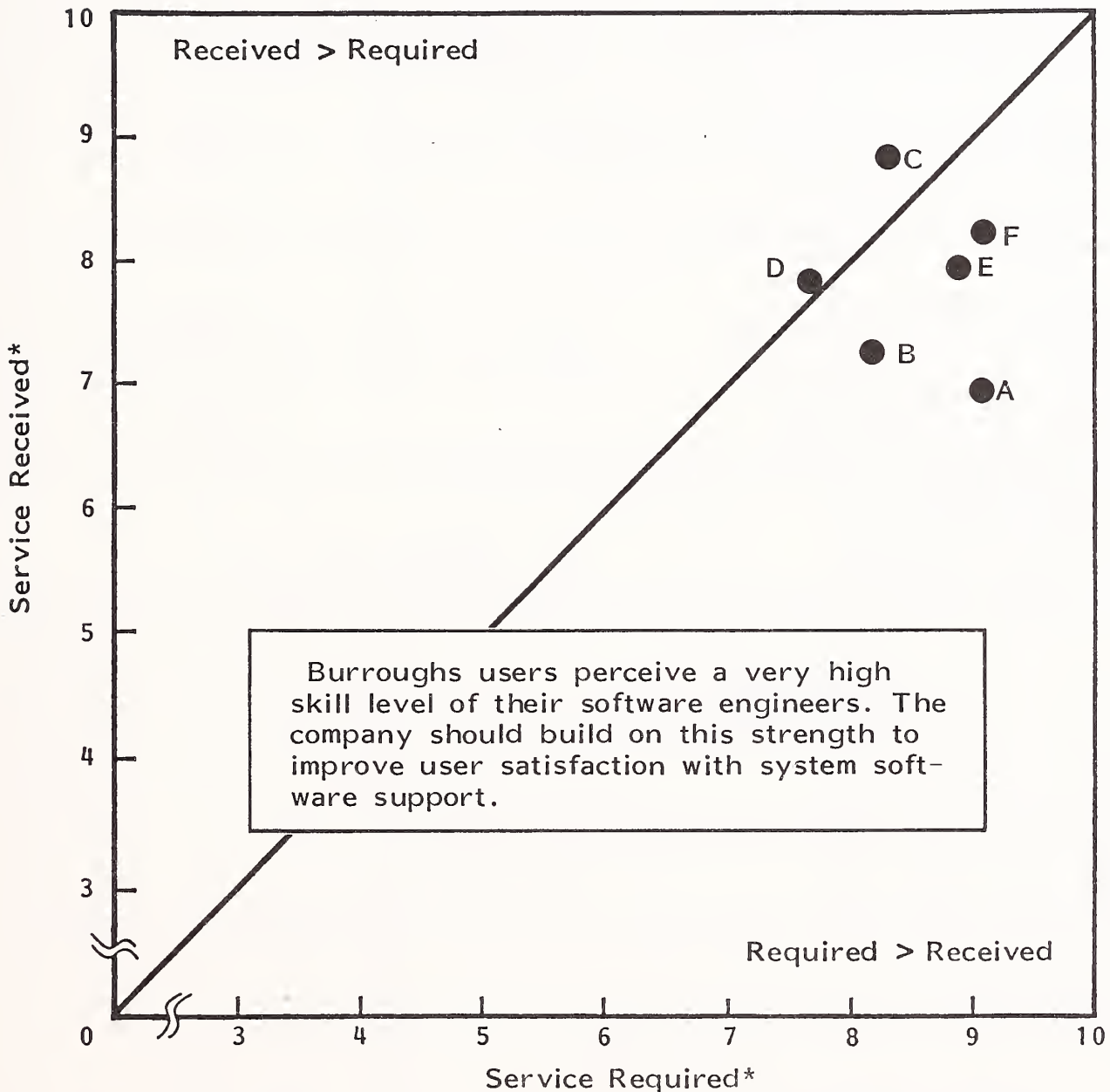


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT III-7

BURROUGHS SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT III-8

HARDWARE SERVICE COMPONENT DATA:
BURROUGHS

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.3
Satisfaction with System Availability	9.0
Satisfaction with Response Time	8.6
Satisfaction with Repair Time	8.2

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	2.4	0.9
Average System Availability (Percent)	90.7%	97.6%
Average Hardware Response Time (Hours)	5.5	1.8
Average Hardware Repair Time (Hours)	3.2	2.2

EXHIBIT III-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA: BURROUGHS

SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	8.2
Satisfaction with Software Response Time	8.4
Satisfaction with Software Repair Time	7.8

*Rating: 1 = Low, 10 = High

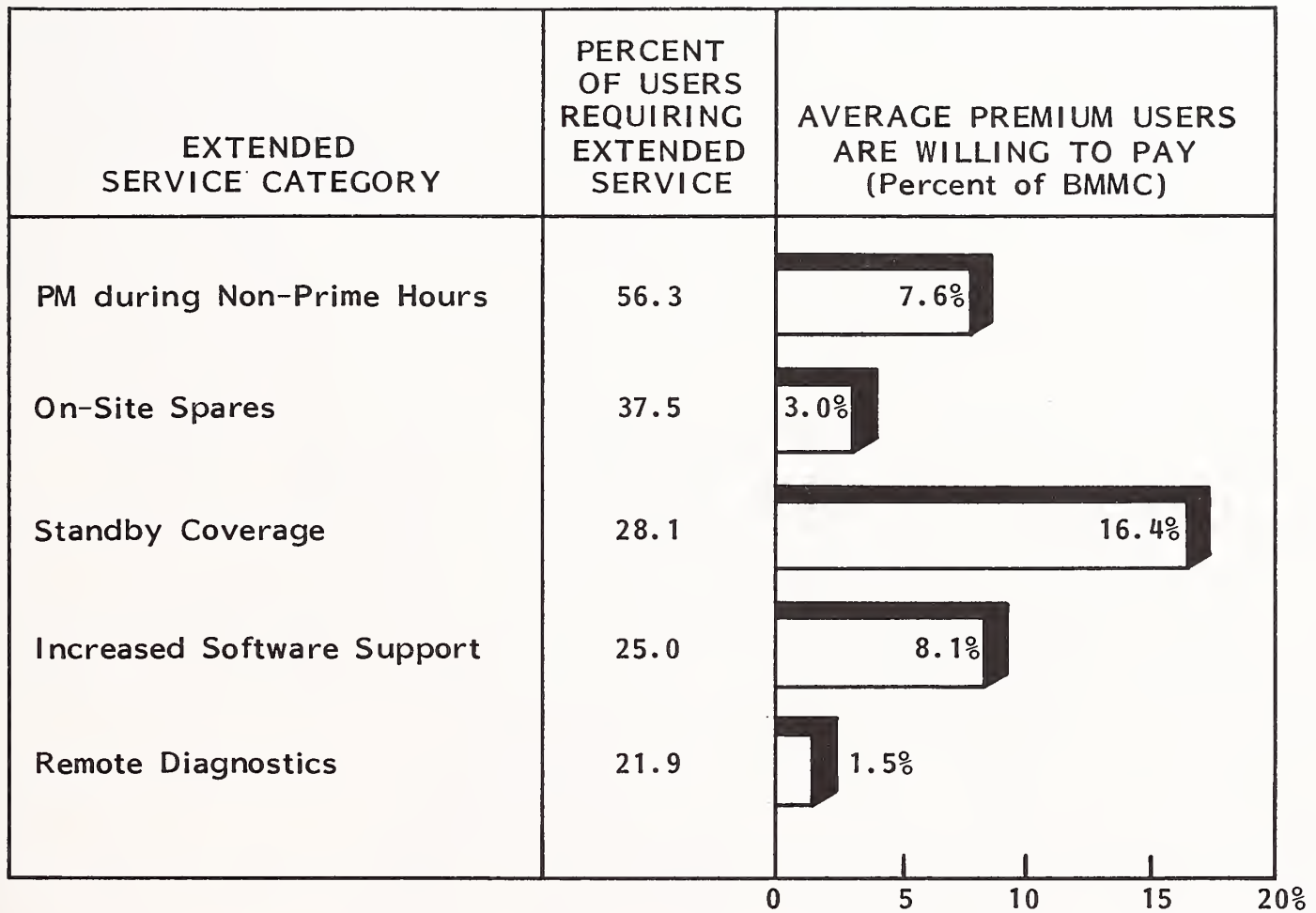
SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.4	0.3
Average Software Response Time (Hours)	11.2	9.3
Average Software Repair Time (Hours)	30.8	12.8

between 1984-1985 system availability increased by 8%, the number of interruptions fell by 63%, and response time improved by 67%.

- System software service between 1984 and 1985 did not improve as dramatically as hardware service did, but Burroughs ranked significantly better than the average small-system vendor. Burroughs small systems, for example, had 50% fewer software interruptions per month than the average, and the Burroughs average software repair time was almost 20% better than the overall average.
- Given the improvements in Burroughs service between 1984 and 1985, it is somewhat surprising that users are willing to pay above average premiums to receive even better service as evidenced in Exhibit III-10. A substantial percentage of Burroughs users are willing to pay high premiums for extended services, clearly indicating increasing service expectations and potential service profitability.

EXHIBIT III-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: BURROUGHS



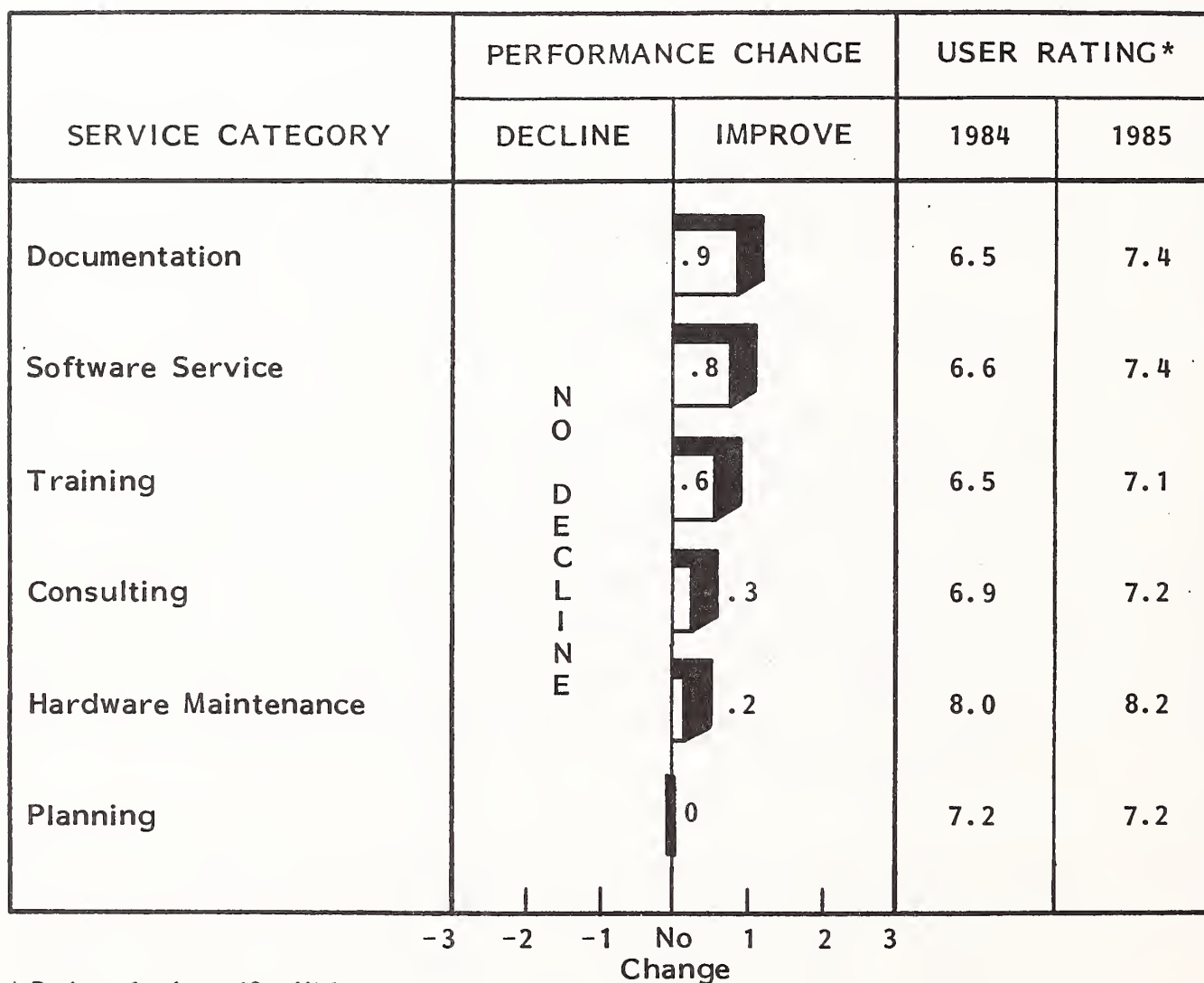
IV DATA GENERAL

IV DATA GENERAL

- Data General Nova, Eclipse, and MV series users reported a wide range of service improvements in 1985. Significant gains were made in hardware documentation and software maintenance, as shown in Exhibit IV-1. However, because DG user expectations for service have increased at such a rapid pace, overall user satisfaction with service has not improved substantially. In some crucial areas, such as overall hardware maintenance, satisfaction has fallen despite higher system and service performance levels.
- Exhibit IV-2 identifies the main problems with Data General hardware service. Parts availability and a low FE skill level are central to the problem, but there are a number of related problems which must be confronted. Data General has been much more active in new product introductions, particularly with the high end MV series. The continuing flow of new products has placed a severe burden on the company's logistics and FE training operations, resulting in the user perception of reduced service, although the machines are more reliable than ever.
- Exhibit IV-3 shows that more dramatic problems exist for DG systems software service. As the company introduces new products and moves into new markets, there is a growing user requirement for systems service--a requirement that the company is apparently not prepared to meet at this time.

EXHIBIT IV-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: DATA GENERAL



* Rating: 1 = Low, 10 = High

EXHIBIT IV-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: DATA GENERAL

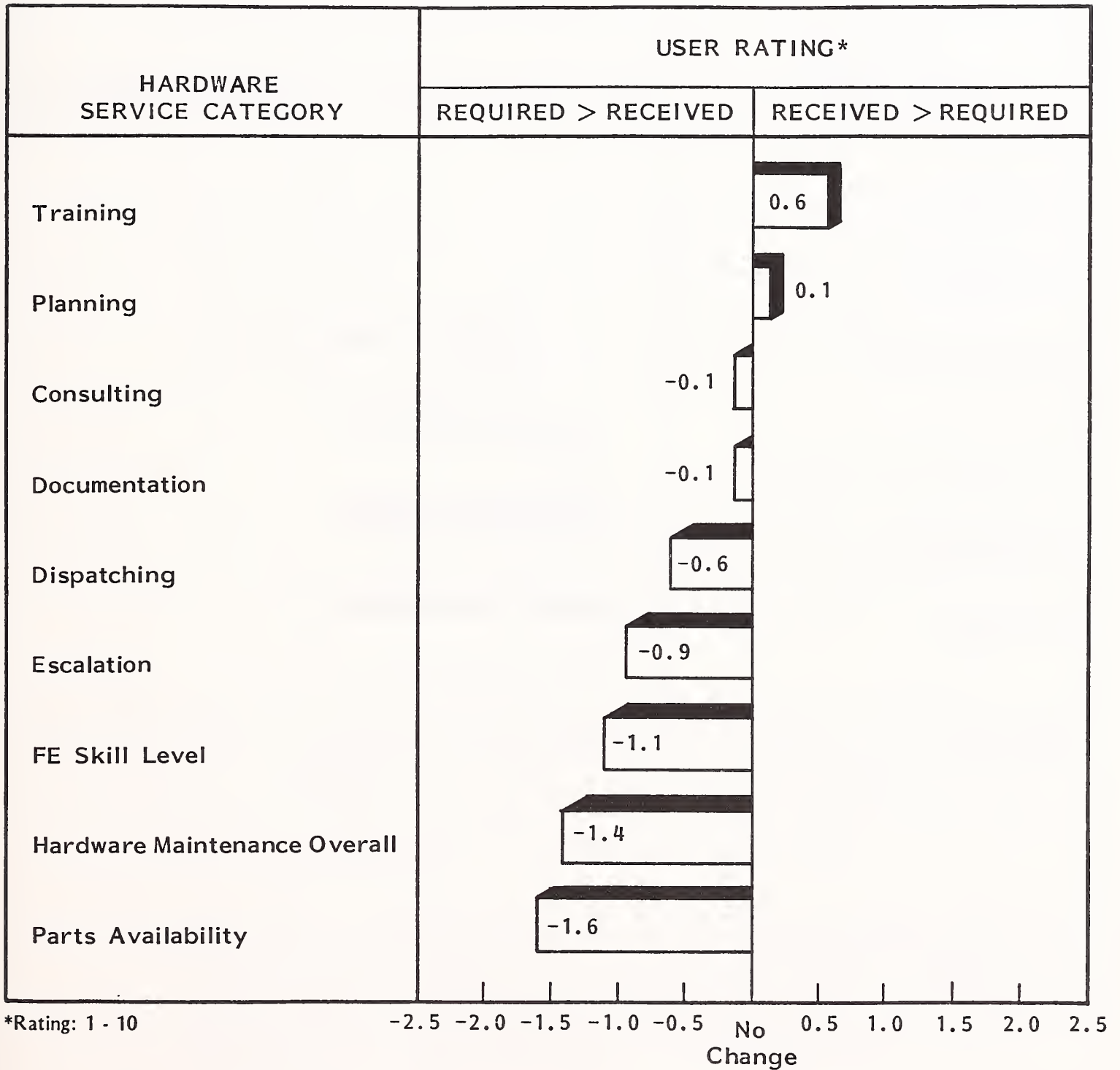
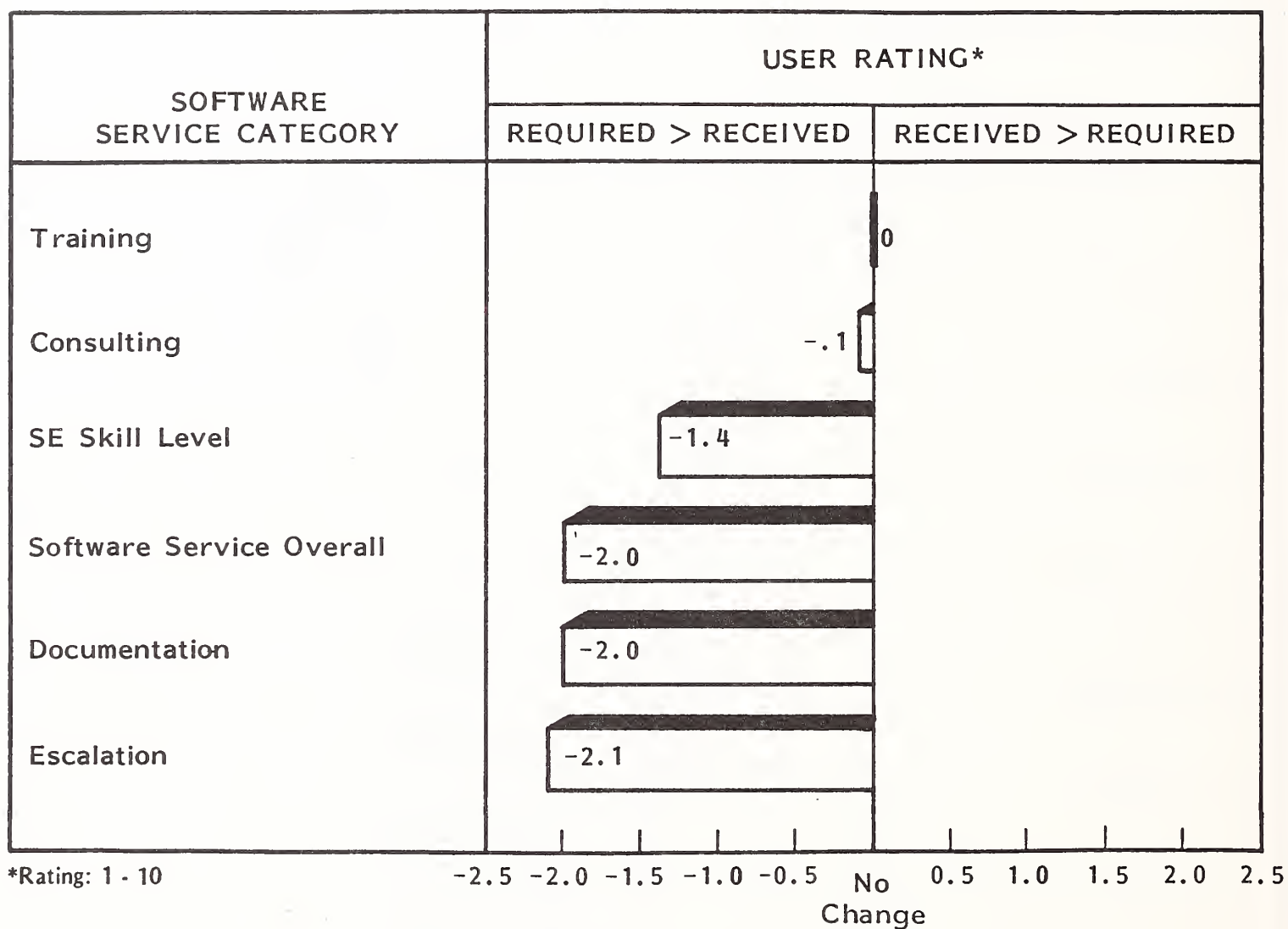


EXHIBIT IV-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: DATA GENERAL



- In the past, the company could depend on its primarily scientific and technical user base to provide self-support for systems software. However, today's users are demanding improved software support and, as Exhibit IV-3 demonstrates, the level of service currently provided falls well below user expectations.
- User satisfaction with hardware service is shown in Exhibit IV-4. DG has a lower satisfaction rate than most other small-system vendors. Even when user responses for the high-end MV series are considered alone, Data General users report somewhat lower than average ratings for hardware support.
- User satisfaction with systems software service (see Exhibit IV-5) is much lower than other small-system vendors. An indication of just how dissatisfied users are with software support is in the area of software documentation. Users requirement for documentation is extremely high indicating that users are performing self maintenance in the absence of direct DG support and yet their satisfaction with the documentation is the lowest of all small-system vendors (14% satisfied).
- A majority of DG users reported not using the company's software services. This is not surprising considering the relatively high dissatisfaction rate of respondents that did use the service; however, it does indicate that a good deal of money is being "left on the table" by Data General in the software support area.
- Exhibits IV-6 and IV-7 demonstrate the rigid prioritization of service reported by DG users. These users perceive that the actual level of service provided is not much higher for high priority services (e.g., FE skill level, parts availability) than it is for lower level services such as consulting.
- Data General's overall hardware performance improved between 1984 and 1985, as shown in Exhibit IV-8. Users report that system availability has improved by 3%, the number of hardware interruptions per month has fallen by 25%, and the average hardware repair time has improved by over 40%.

EXHIBIT IV-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
DATA GENERAL

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Hardware Maintenance Overall	9.6	8.2	25.0%
FE Skill Level	9.4	8.3	25.0
Parts Availability	9.4	7.8	38.6
Escalation	8.9	8.0	50.0
Dispatching	8.8	8.2	56.8
Documentation	7.5	7.4	51.3
Consulting	7.3	7.2	36.7
Planning	7.1	7.2	37.5
Training	6.5	7.1	50.0




A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT IV-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE:
DATA GENERAL

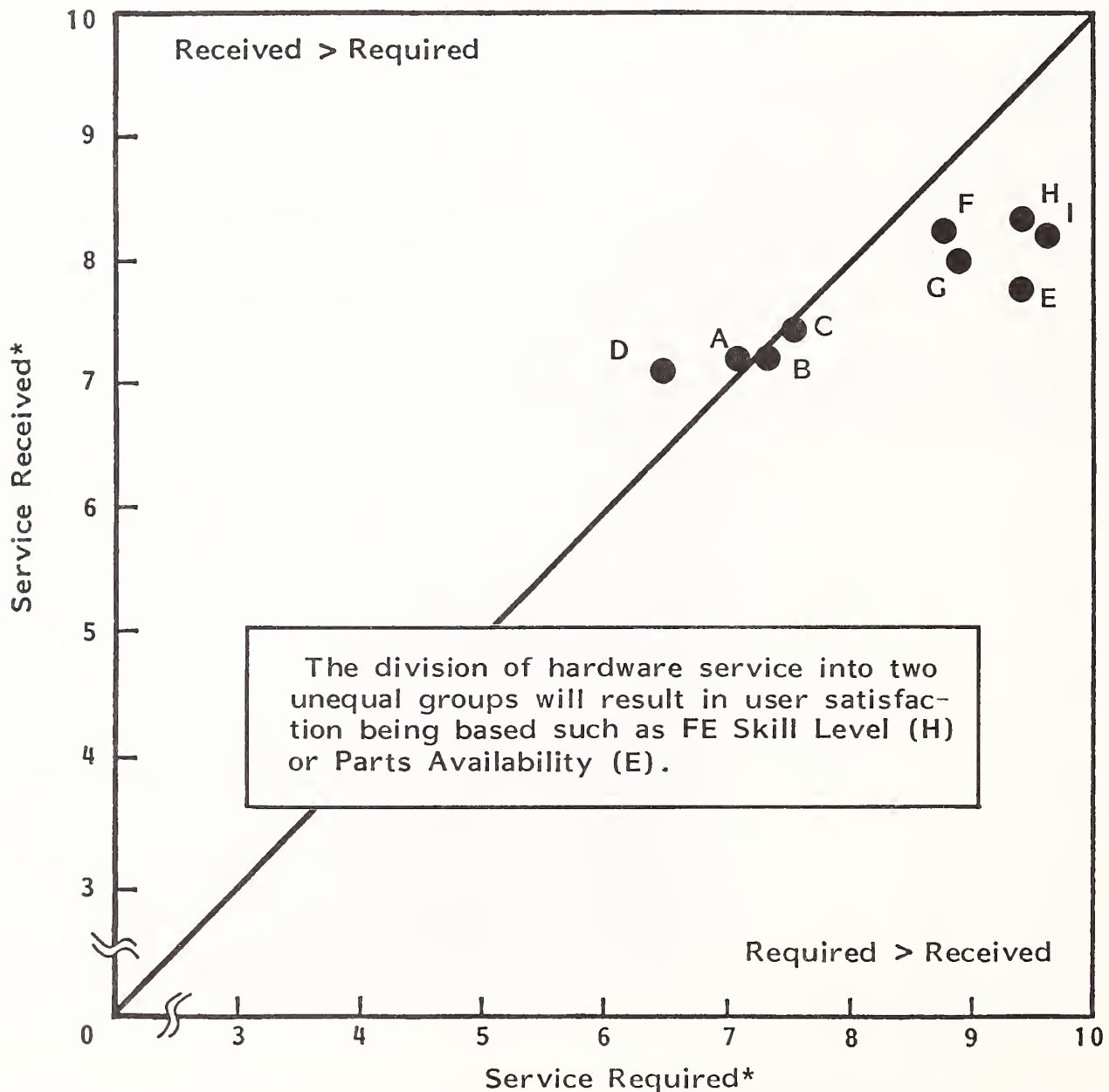
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Software Service Overall	9.4	7.4	22.2%
Documentation	9.1	7.1	14.0
SE Skill Level	8.9	7.4	33.3
Escalation	8.7	6.6	20.0
Training	7.3	7.3	40.0
Consulting	6.5	6.4	35.7

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT IV-6

DATA GENERAL HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

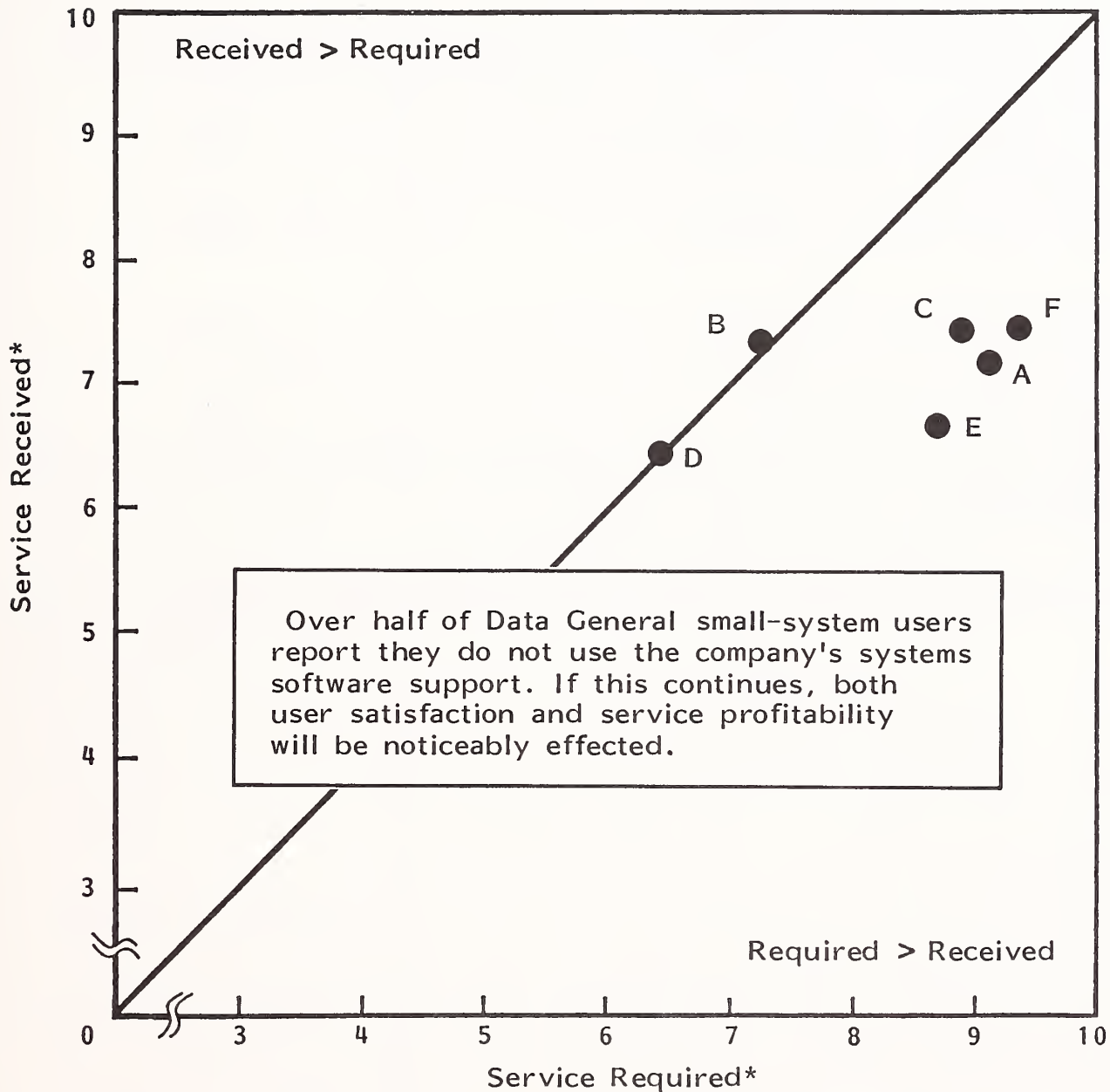


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT IV-7

DATA GENERAL SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT IV-8

HARDWARE SERVICE COMPONENT DATA: DATA GENERAL

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.0
Satisfaction with System Availability	8.8
Satisfaction with Response Time	8.3
Satisfaction with Repair Time	8.2

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.6	1.2
Average System Availability (Percent)	93.6%	95.9%
Average Hardware Response Time (Hours)	3.5	3.9
Average Hardware Repair Time (Hours)	5.2	3.1

- Actual system software support performance from Data General in 1985 was, in most cases, not up to 1984 performance levels, as shown in Exhibit IV-9. DG users reported a higher number of software-related system interruptions in 1985 than in 1984 and systems software repair time more than doubled. In one significant area of improvement, systems software response time, DG bettered 1984 performance by over 70% in 1985.
- Despite the fact that Data General users have very high service expectations, Exhibit IV-10 demonstrates that they are relatively price sensitive about paying a premium for extended services. In all categories but the one for PM, a lower than average percent of DG users requires the extended services listed in Exhibit IV-10.
- It is surprising that only 20% of DG users require increased software support. INPUT believes that this is the result of the self-sufficiency which has been imposed on DG systems software users. It is likely, however, that as the operating systems become more complex (particularly in high-end superminis) there will be a much more substantial demand for service. As Data General moves into new markets, such as office automation, this demand for improved service will affect not just user satisfaction rates, but purchase decisions as well.

EXHIBIT IV-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA: DATA GENERAL

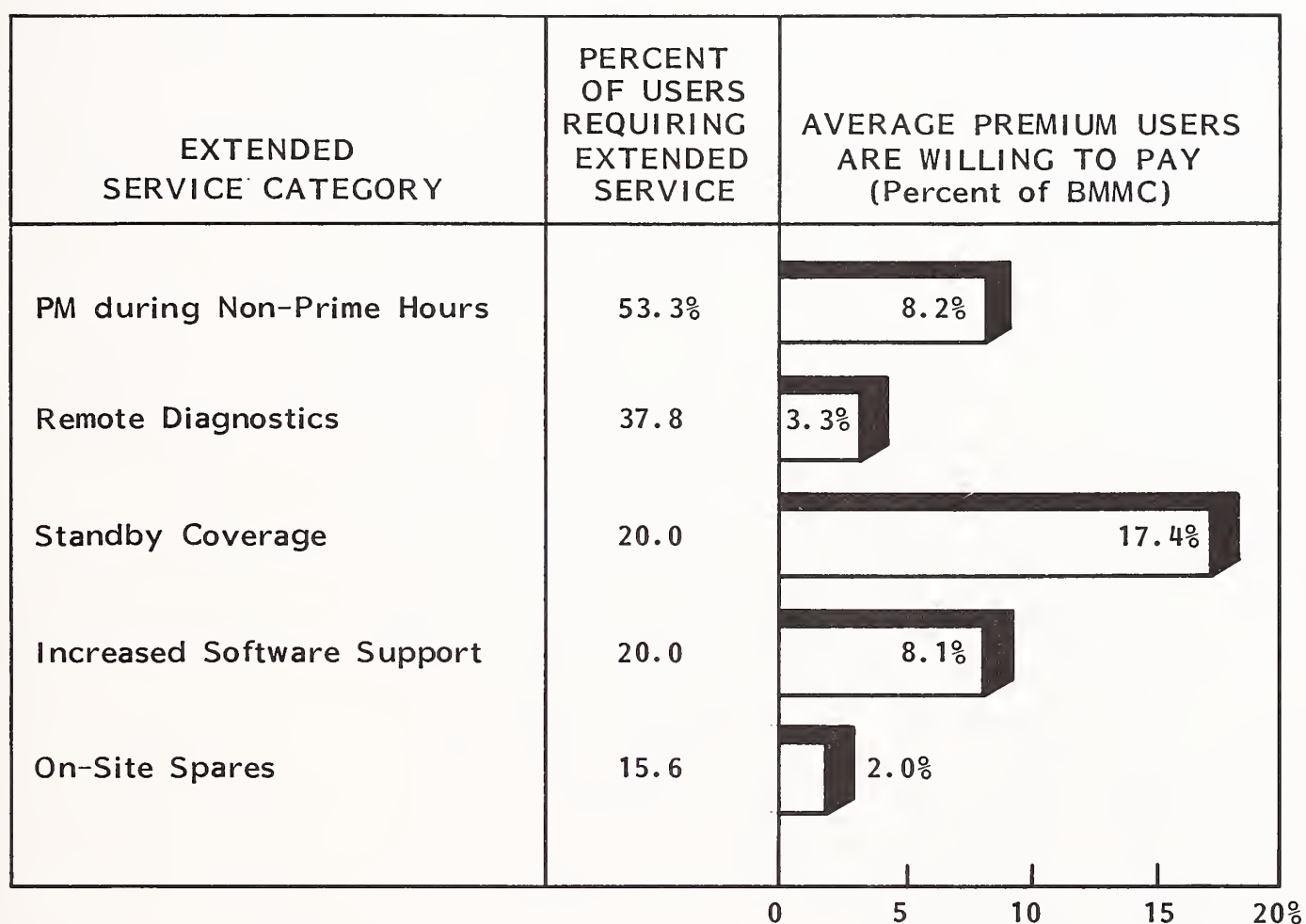
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	6.6
Satisfaction with Software Response Time	7.1
Satisfaction with Software Repair Time	7.1

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.8	0.9
Average Software Response Time (Hours)	8.4	2.4
Average Software Repair Time (Hours)	19.1	37.8

EXHIBIT IV-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: DATA GENERAL



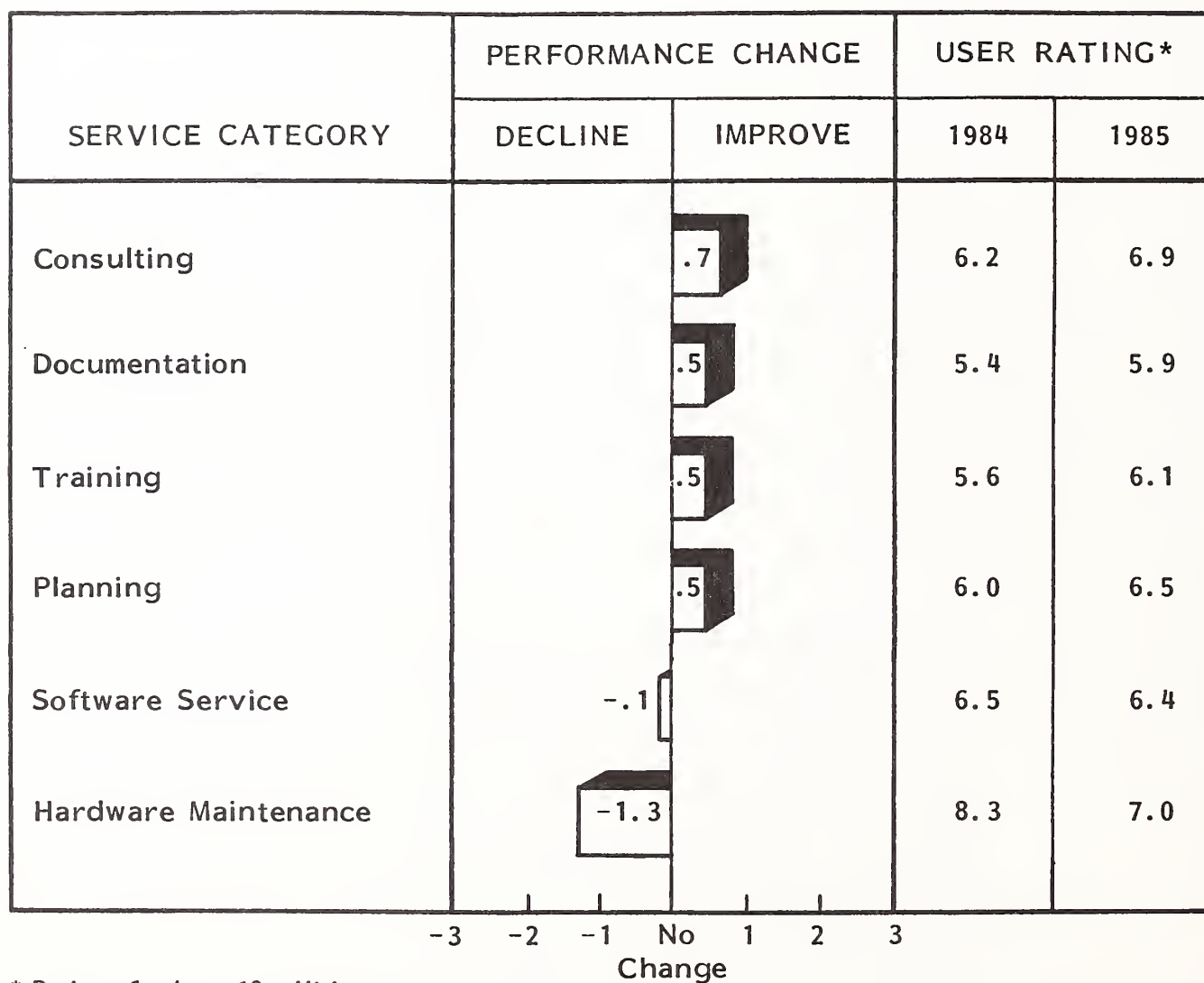
V DATAPOINT

V DATAPoint

- In 1985 INPUT interviewed a total of 17 Datapoint users of 8600 and 8800 equipment. These users have had their machines installed for an average of 2.3 years, somewhat less than the average (2.9 years) for all small-system users.
- Datapoint users reported some service improvements, as demonstrated in Exhibit V-1. However, in the crucial area of hardware maintenance, user ratings fell quite substantially. Because service improvements were made in low priority areas, such as documentation and user training, rather than high priority areas, satisfaction with service has not been impacted. In fact, overall satisfaction rates have fallen as a result of user dissatisfaction with hardware service.
- The abrupt turnaround in Datapoint user attitudes about hardware service (demonstrated in Exhibit V-2) must be qualified by several factors.
 - INPUT's 1985 study surveyed more recently introduced CPU's (8600, 8800) than in 1984 when the 6600 machines were covered. These newer machines undoubtedly had some initial technical problems which influenced user responses.
 - Datapoint user expectations for service have increased in almost all areas in 1985, reflecting the increasing importance of systems to the user base.

EXHIBIT V-1

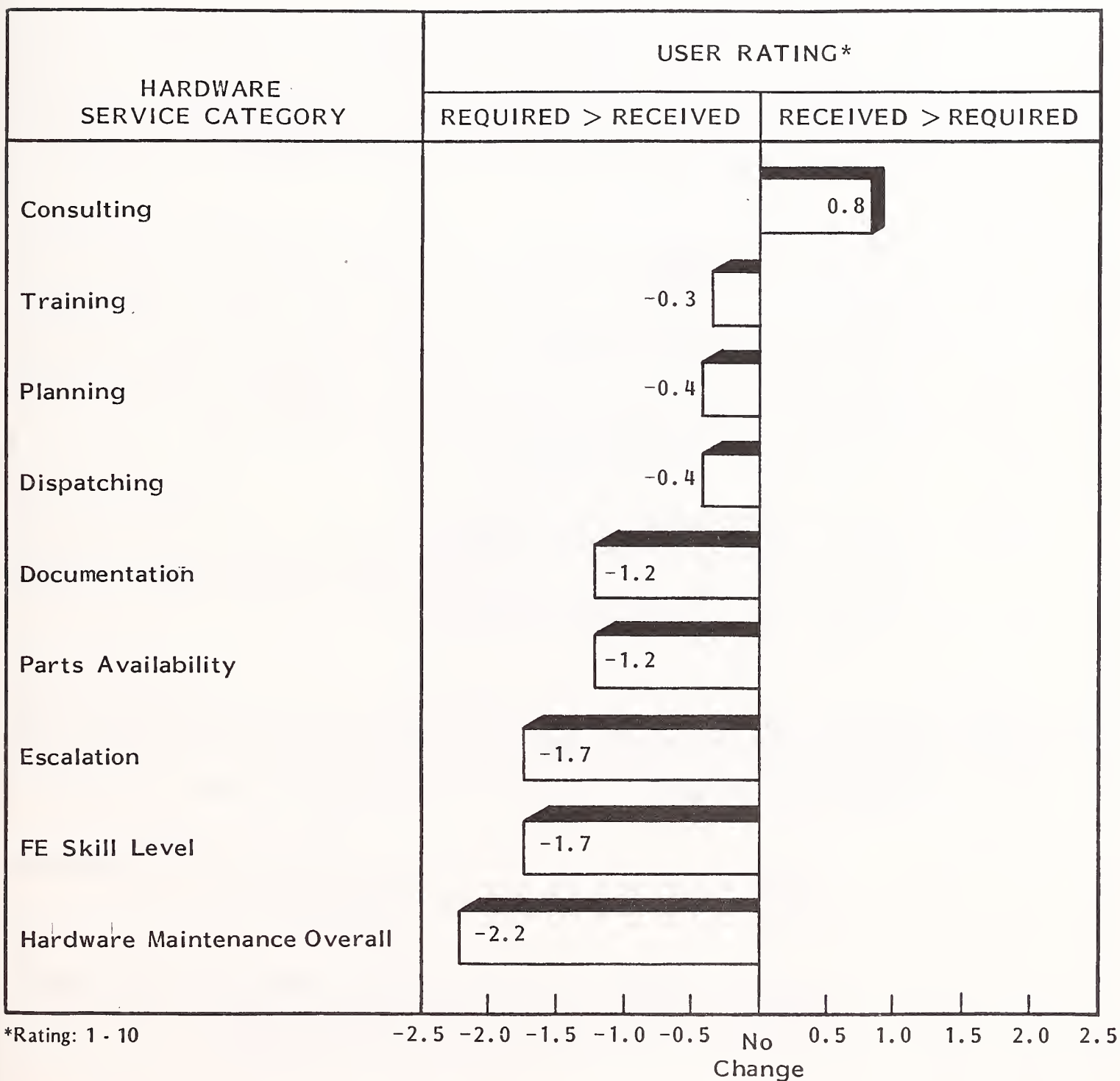
SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: DATAPOINT



* Rating: 1 = Low, 10 = High

EXHIBIT V-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: DATAPOINT



- The skill level of hardware and software engineers, as well as escalation procedures, are important areas of concern for Datapoint users. As shown in Exhibits V-2 and V-3, vendor performance in these areas falls far short of user expectations. Clearly, Datapoint users perceive a decline in the capabilities of the field and software engineers.
- As is the case with many other vendors, Datapoint documentation is not up to user expectations, but Datapoint user expectations for documentation have increased so quickly that it is unlikely that any vendor could have adjusted fast enough. User expectations in this area increased 37% in just one year.
- User satisfaction with hardware and software service are included in Exhibits V-4 and V-5. Between 85-90% of all Datapoint users are dissatisfied with overall hardware and software maintenance in 1985. Having such an overwhelming majority of dissatisfied users would naturally alarm the vendor, but when this is compared to a relatively low dissatisfaction rate in 1984 (25-30%), a turnaround in user attitudes toward service is seen.
- Exhibits V-6 and V-7 show that Datapoint users are not receiving the level of service they expect. Even in the area of software support--an area in which Datapoint should be very strong--almost all users are clearly dissatisfied with the service Datapoint provides.
- Users of Datapoint small systems rank almost all services offered by the vendor as substandard, yet when Datapoint's actual performance is measured against other vendors, the company scores better than expected.
 - Average system availability (95.2%) is just 1% below the average for all small-system vendors, as shown in Exhibit V-8.
 - Hardware response time improved 55% in 1985 and was significantly better than the average for all small-system vendors.

EXHIBIT V-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: DATAPOINT

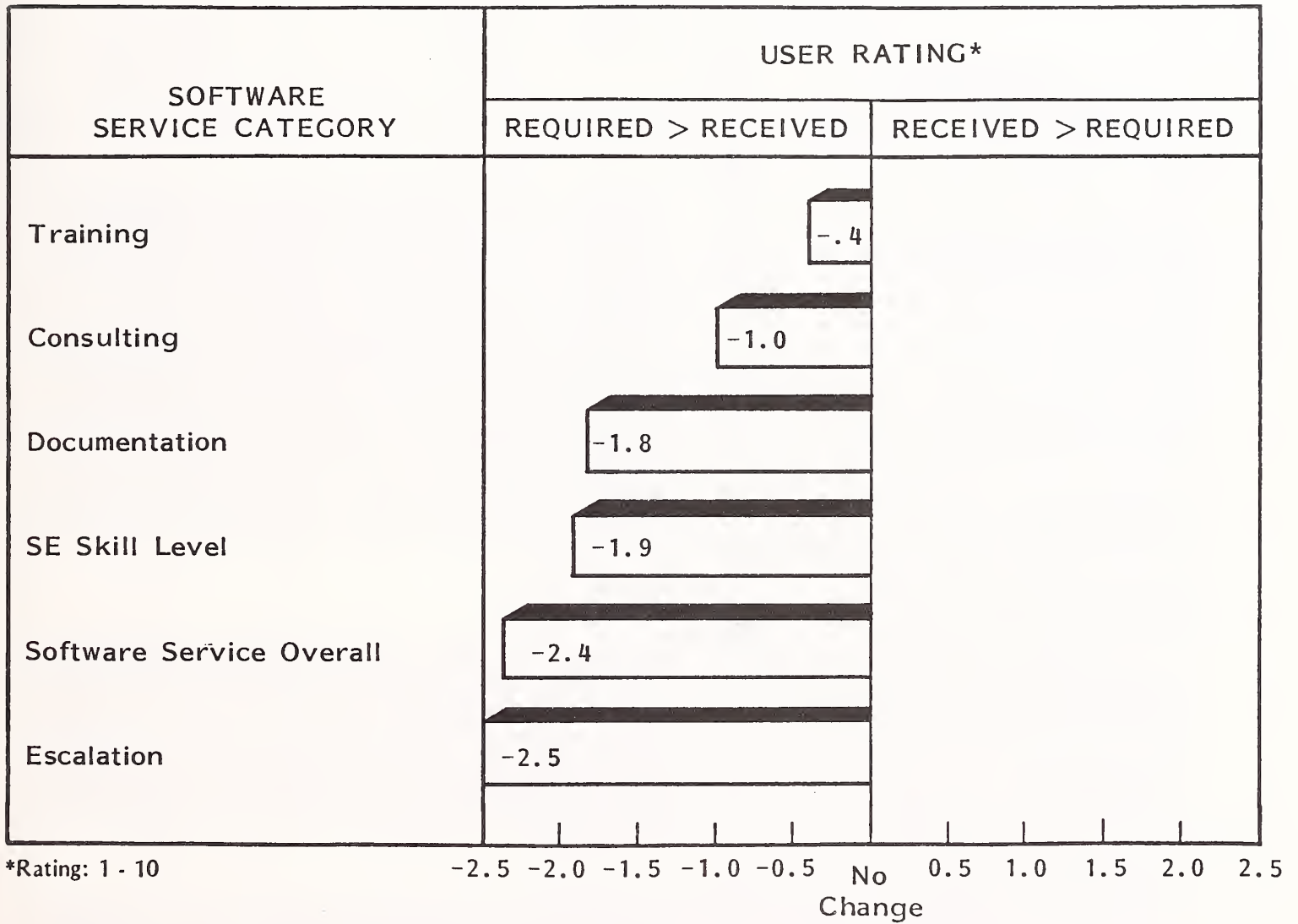


EXHIBIT V-4

1985 USER SATISFACTION WITH HARDWARE SERVICE: DATAPOINT

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Hardware Maintenance Overall	9.2	7.0	12.5%
FE Skill Level	9.1	7.4	18.8
Parts Availability	8.6	7.4	35.3
Escalation	8.5	6.8	41.2
Dispatching	8.3	7.9	62.5
Documentation	7.1	5.9	43.8
Planning	6.9	6.5	36.4
Training	6.4	6.1	57.1
Consulting	6.1	6.9	46.2


☐ A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT V-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: DATAPOINT

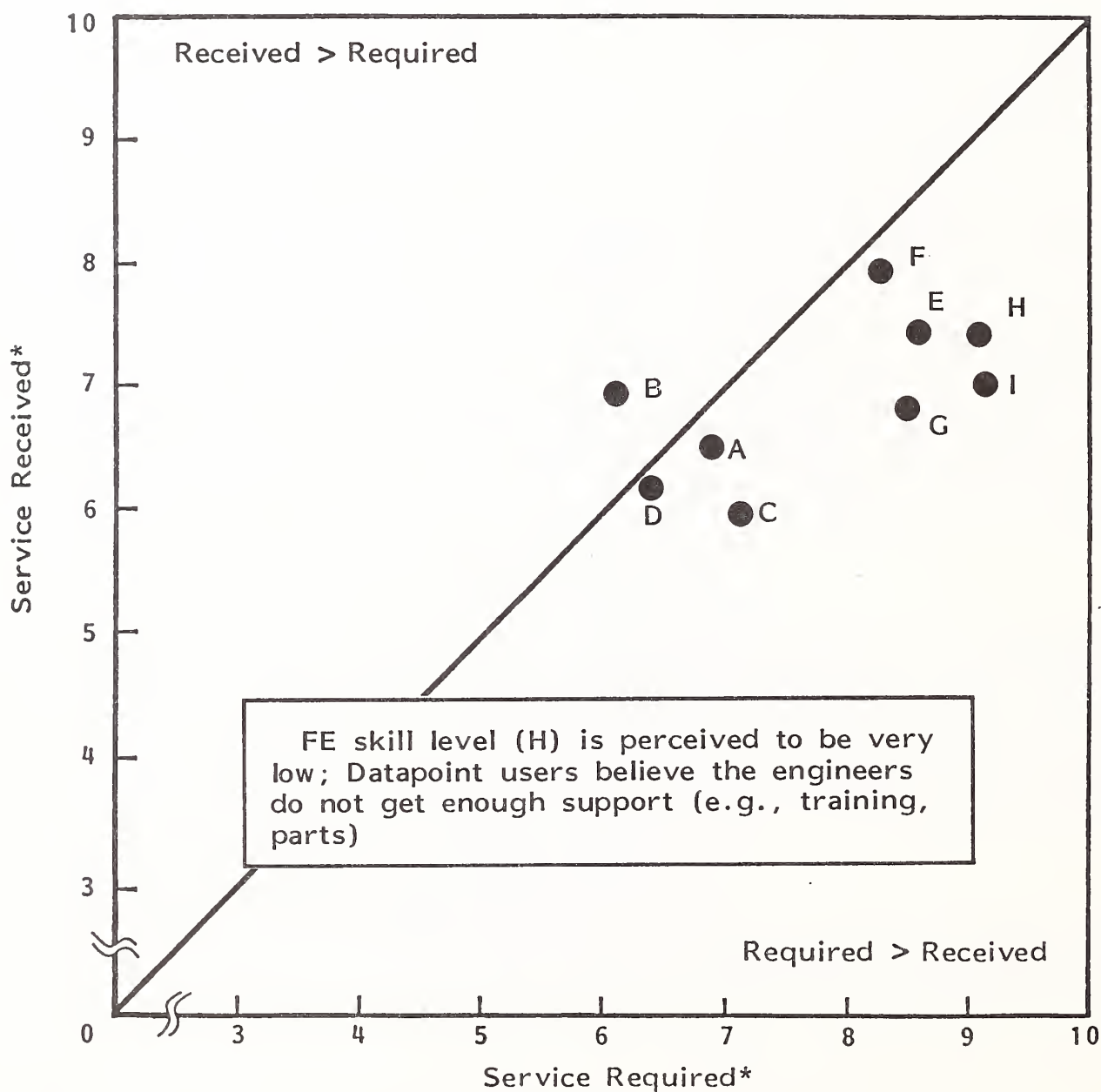
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Software Service Overall	8.8	6.4	13.3
SE Skill Level	8.6	6.7	35.7
Escalation	8.6	6.1	14.3
Documentation	8.4	6.6	14.3
Consulting	7.3	6.3	33.3
Training	6.8	6.4	42.9

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT V-6

DATAPOINT HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

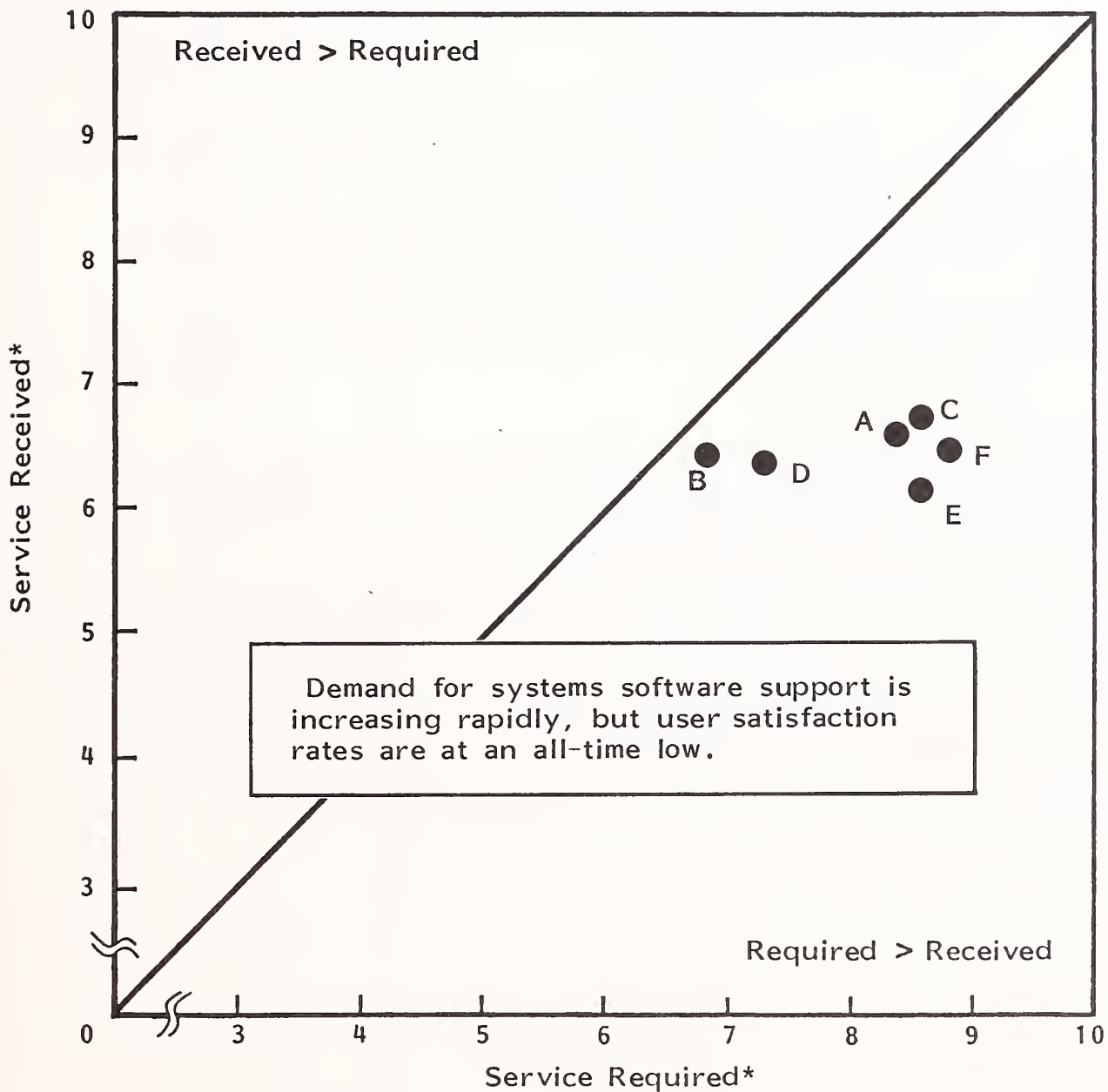


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT V-7

DATAPOINT SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT V-8

HARDWARE SERVICE COMPONENT DATA:
DATAPOINT

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	7.6
Satisfaction with System Availability	7.3
Satisfaction with Response Time	7.5
Satisfaction with Repair Time	7.5

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.0	1.4
Average System Availability (Percent)	89.1%	95.2%
Average Hardware Response Time (Hours)	5.6	2.5
Average Hardware Repair Time (Hours)	3.1	6.8

- Datapoint user expectations are also very high for systems software support, as shown in Exhibit V-9. Although Datapoint systems have fewer software errors than the average small system, and repair times are less, Datapoint users report a much lower satisfaction than average with software support. For example, although Datapoint average software repair time is 18% faster than the average for other small-system vendors, overall satisfaction with Datapoint software repair time (6.4) is much lower than the average for other vendors (7.0).
- Datapoint users are among the most service price-sensitive of all small-system users. They were least satisfied with the current cost of service and they rated service price most important in new equipment selection. Exhibit V-10 demonstrates that while up to 53% of Datapoint users require some extended service, the premiums they are willing to pay for such services are quite low.
- INPUT believes that Datapoint users will continue to be service price-sensitive as long as they remain dissatisfied with service. The company must address user service concerns, particularly with escalation, parts availability, and engineer training. Currently, Datapoint system availability, response time, and repair time performance is not inordinately low. However, the company's users perceive a serious problem with both hardware and software support, and it is this perception with which Datapoint must deal.

EXHIBIT V-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
DATAPOINT

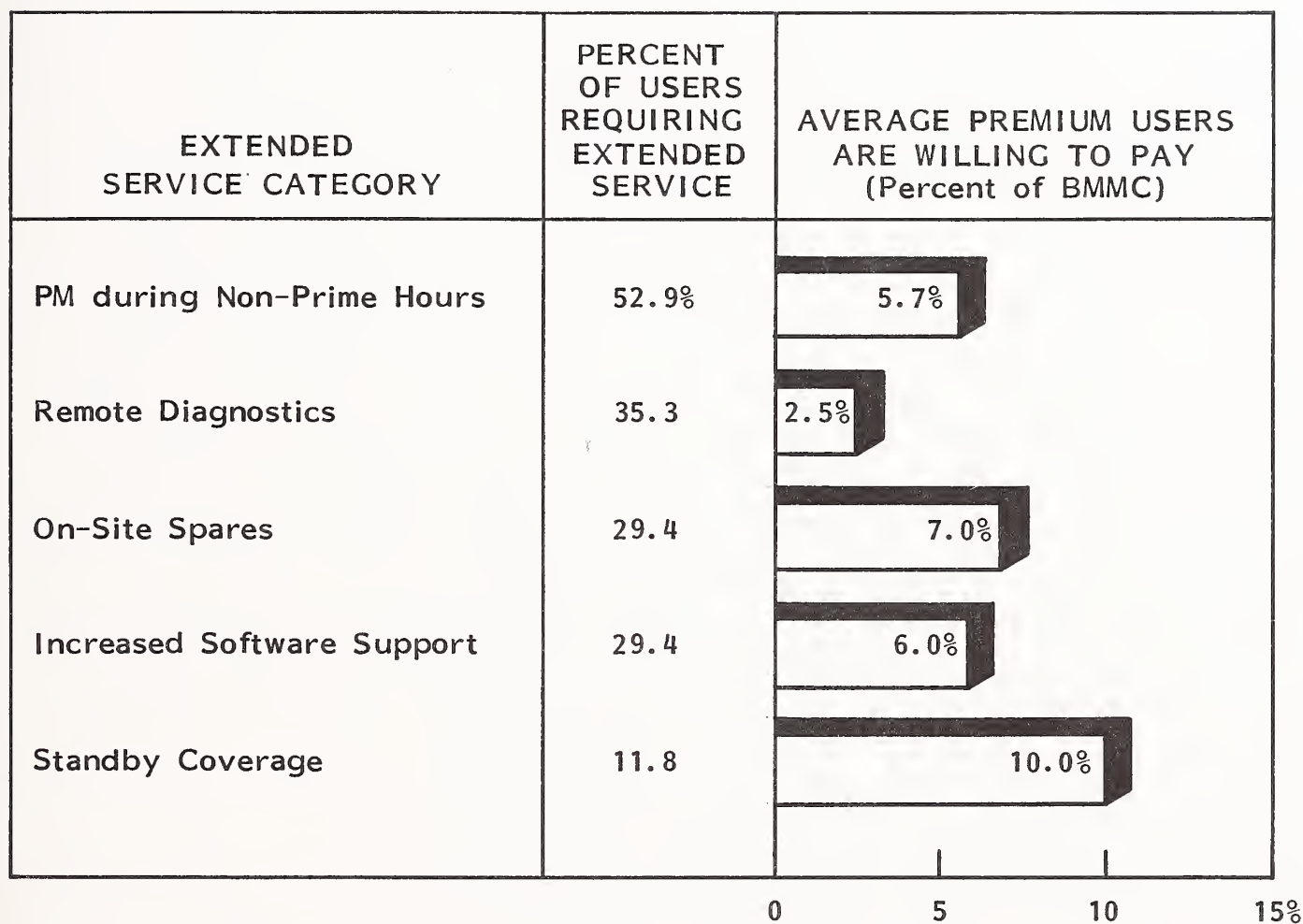
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	6.8
Satisfaction with Software Response Time	6.2
Satisfaction with Software Repair Time	6.4

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.3	0.5
Average Software Response Time (Hours)	11.9	16.3
Average Software Repair Time (Hours)	30.7	12.9

EXHIBIT V-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: DATAPOINT



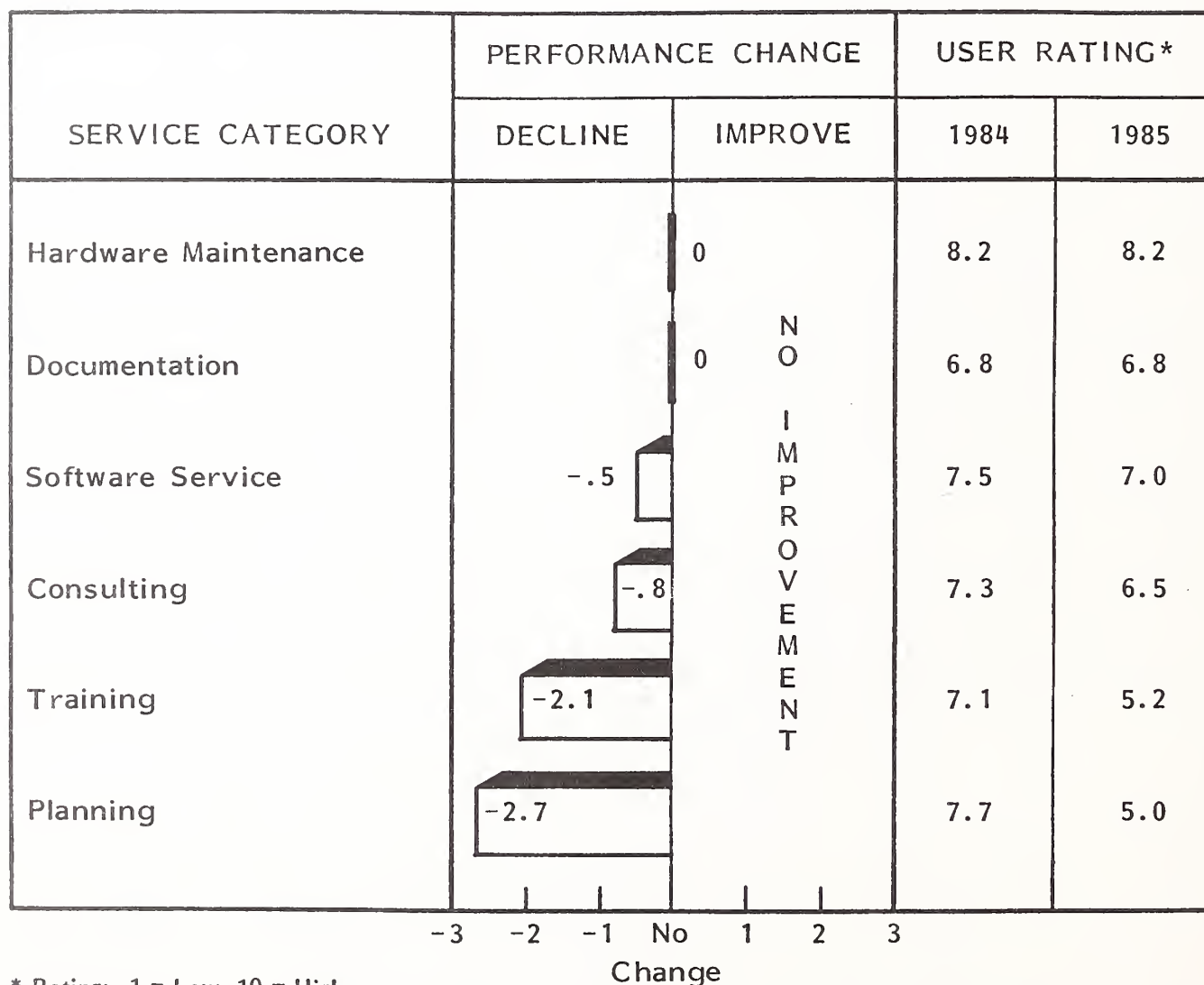
VI DEC

VI DEC

- Forty-nine DEC small-system users were interviewed in 1985, including 29 VAX users and 20 PDP 11/70 users. The average installed age of the DEC CPU's in this study was 4.3 years, considerably older than most other small systems included in this report.
- Despite the age of the installed base, DEC users reported more satisfaction than the average with both hardware and software support. Users report that overall system availability has increased dramatically, the total number of system interruptions have gone down, and response and repair times have improved.
- While overall satisfaction with service has increased, Exhibit VI-1 demonstrates that service performance in some low priority areas, such as planning and training, has fallen. This decline in performance has not had a major impact on satisfaction rates, however, because direct hardware and software support tends to influence DEC user satisfaction rates the most.
- Exhibits VI-2 and VI-3 list the various components of hardware and software service and depict DEC service strengths and weaknesses. Parts availability is a major hardware weakness which is clearly affecting user evaluations of both escalation and FE skill level. Similarly, in software service (see Exhibit VI-3), escalation and SE skill level are DEC's major problem areas--both of which fall far short of user expectations.

EXHIBIT VI-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: DEC



* Rating: 1 = Low, 10 = High

EXHIBIT VI-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: DEC

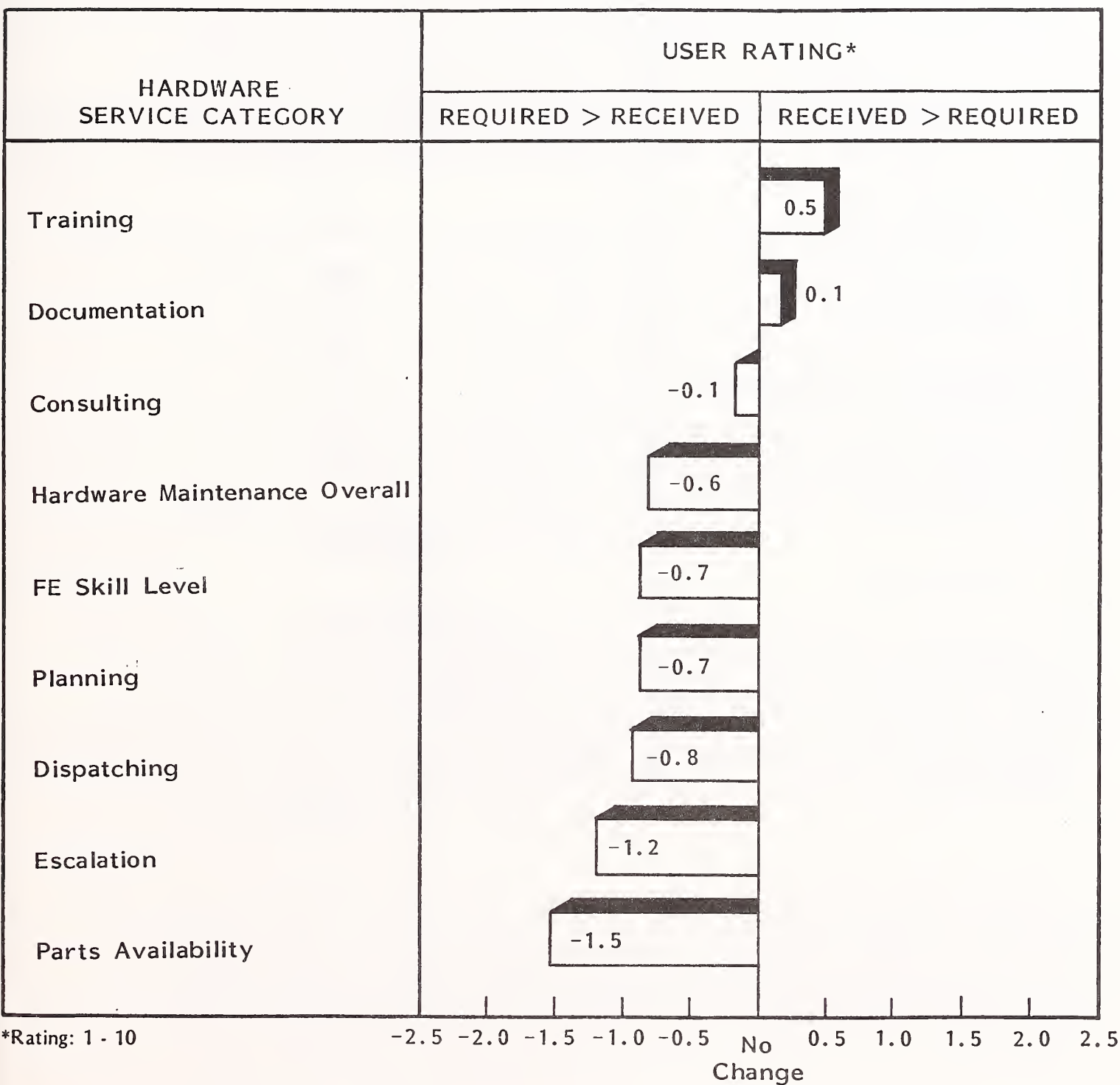
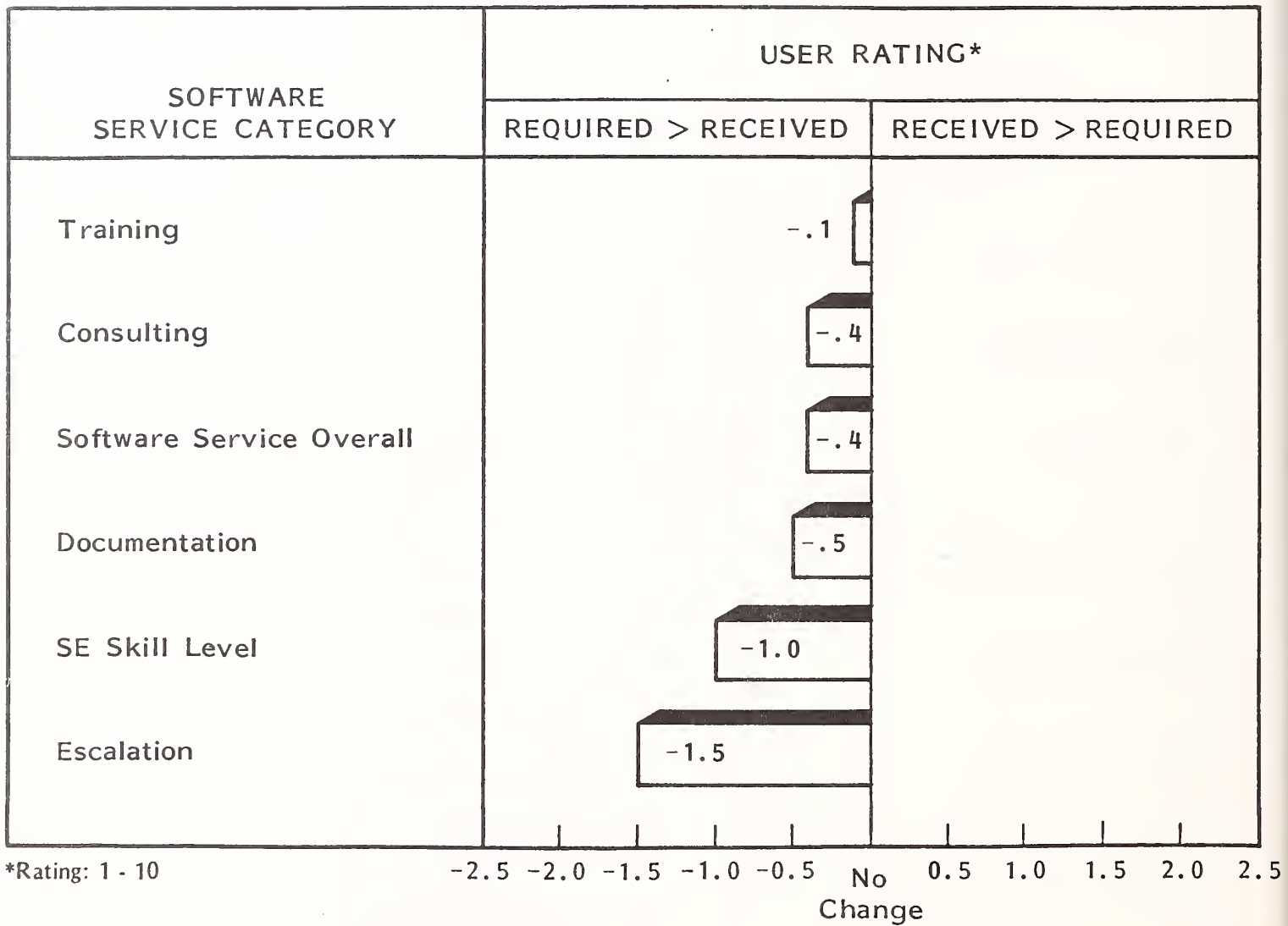


EXHIBIT VI-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: DEC



- Although user expectations for hardware service are not met in seven out of nine key service areas, overall satisfaction remains high, as shown in Exhibit VI-4. Only in the areas of parts availability and, to a lesser extent, escalation, have there been any serious erosions of user satisfaction rates.
- INPUT believes that DEC user satisfaction rates with hardware service have remained high because the users perceived that DEC has attempted to focus service into what the users see as high priority areas, rather than concentrating on low requirement service. In fact, most DEC users are quite satisfied with low priority services such as planning and consulting although their stated needs are not being fully met by DEC.
- DEC user satisfaction with software support is considerably lower than with hardware support, as shown in Exhibit VI-5. Although the satisfaction rates in this exhibit are low, DEC user satisfaction with software support is higher in key areas, such as documentation and overall maintenance, than the average for other small-system users. But like other small-system users, DEC user expectations for systems software support have been increasing dramatically over the past two to three years. Growing expectations for service will probably keep satisfaction rates low, despite the steady improvements DEC has made and will continue to make in this area.
- Exhibits VI-6 and VI-7 plot hardware and software services according to user requirements and the actual level of service provided by the vendor. Overall, these exhibits demonstrate the wide dispersion of user requirements. DEC should concentrate on meeting high requirement service. This will have the greatest impact on user satisfaction and will make users more likely to value other services offered by the company.
- Actual DEC hardware performance data (as reported by the user) is shown in Exhibit VI-8. As can be seen in this exhibit, DEC performance has improved substantially since 1984. Average system availability has increased by over 9% and response/repair time is 52% better in 1985 than 1984. The number of

EXHIBIT VI-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
DEC

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Hardware Maintenance Overall	8.8	8.2	60.4%
FE Skill Level	8.8	8.1	50.0
Parts Availabiltiy	8.7	7.2	36.7
Escalation	8.6	7.4	47.9
Dispatching	8.3	7.5	60.4
Documentation	6.7	6.8	68.9
Consulting	6.6	6.5	71.1
Planning	5.7	5.0	50.0
Training	4.7	5.2	66.7




A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT VI-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: DEC

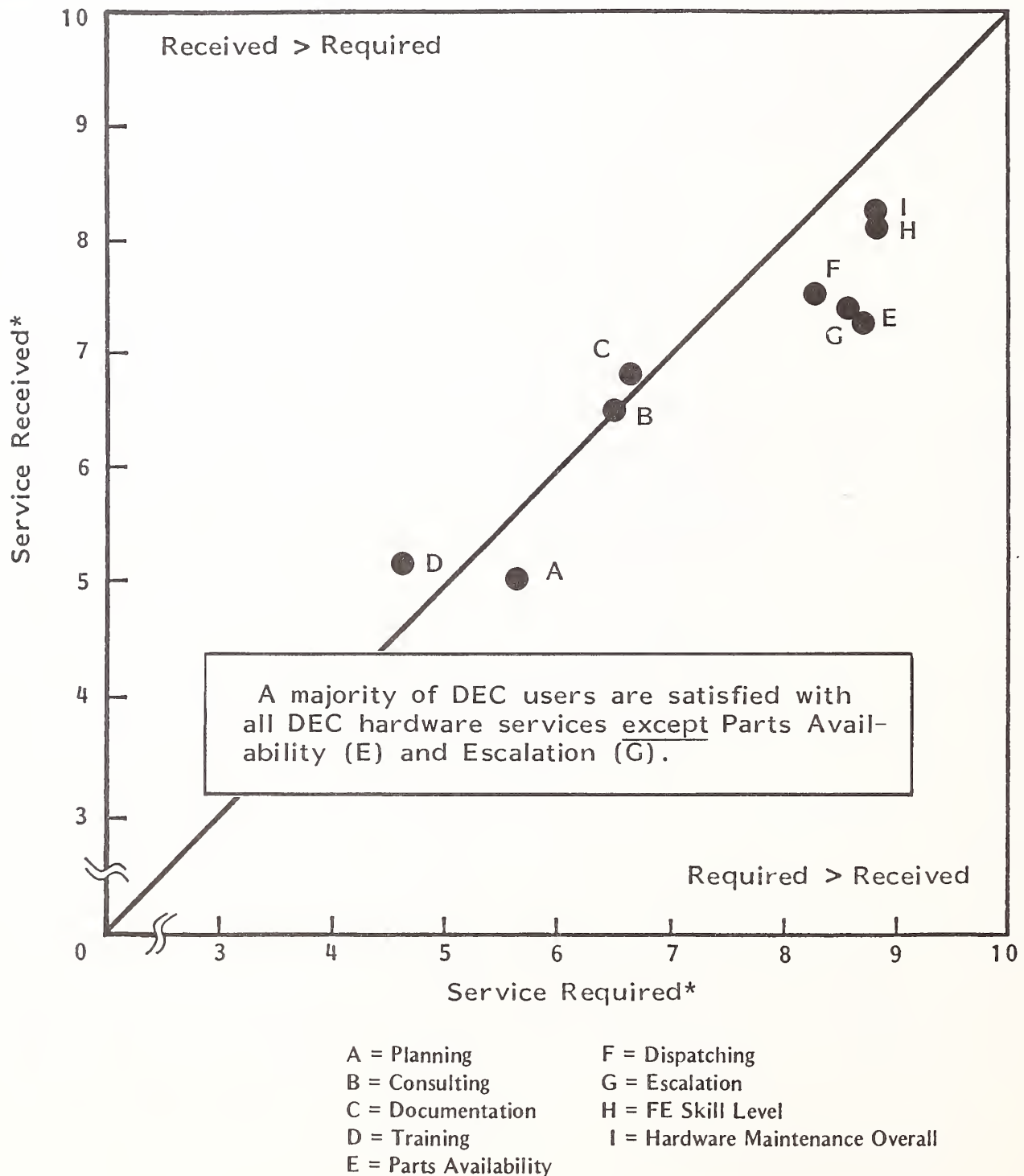
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	8.3	7.8	48.6%
Software Service Overall	7.4	7.0	48.3
Escalation	7.2	5.7	44.4
Training	6.5	6.4	54.8
SE Skill Level	6.5	5.5	44.8
Consulting	5.9	5.5	51.9

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT VI-6

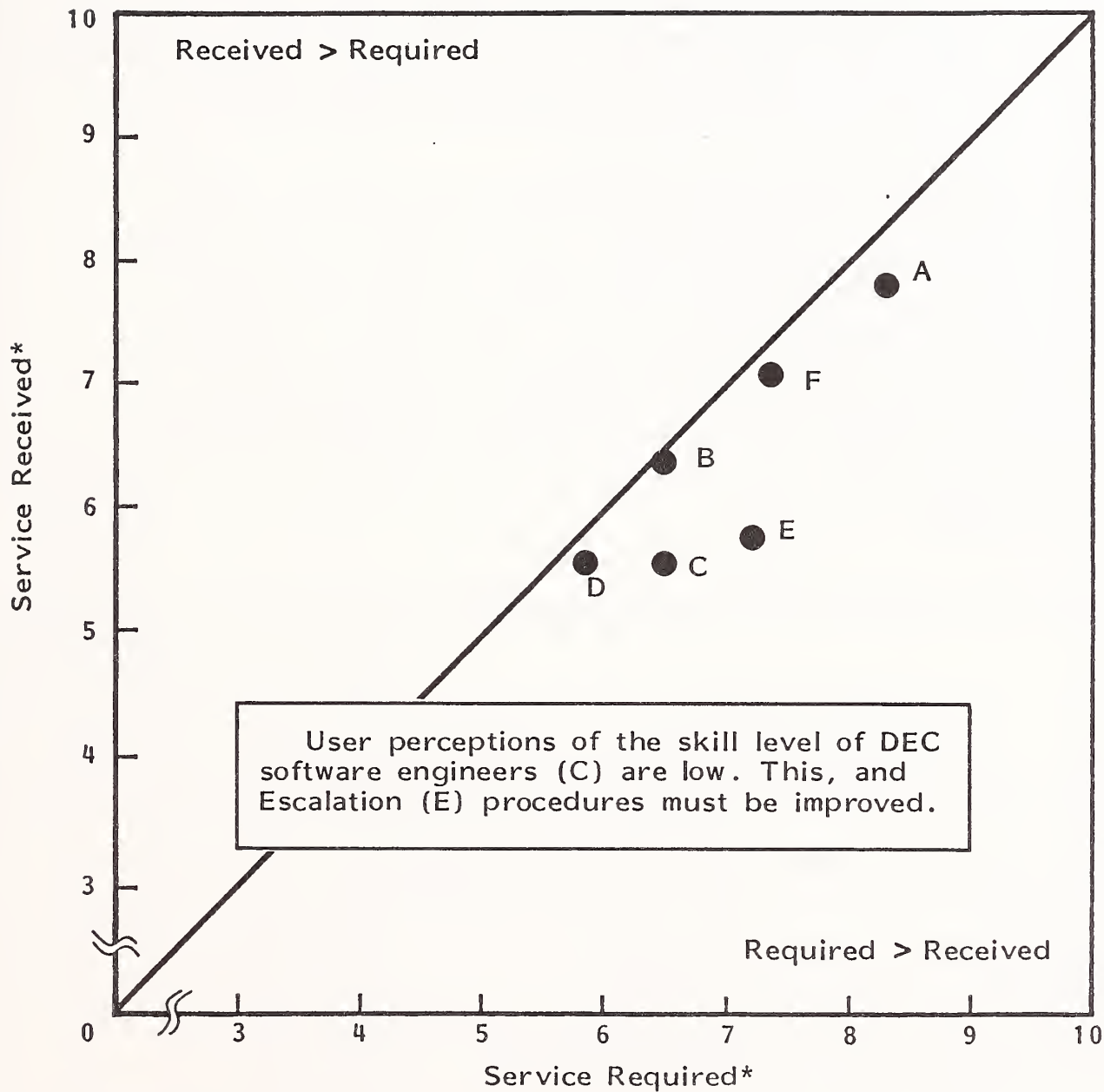
DEC HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



*Rating: 1 = Low, 10 = High

EXHIBIT VI-7

DEC SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT VI-8

HARDWARE SERVICE COMPONENT DATA:
DEC

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.2
Satisfaction with System Availability	8.7
Satisfaction with Response Time	8.3
Satisfaction with Repair Time	8.0

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.8	1.5
Average System Availability (Percent)	88.3%	96.3%
Average Hardware Response Time (Hours)	6.9	2.5
Average Hardware Repair Time (Hours)	6.3	3.8

hardware system interruptions fell by just under 17%. As a result of this improved hardware service performance, overall satisfaction with system availability and service in general has increased substantially.

- Although similar improvements in actual DEC system software performance are indicated in Exhibit VI-9, the impact on user satisfaction has been negligible. Although DEC improved software response time by 20% in 1985, and repair time improved by 42%, overall user satisfaction ratings remain substantially lower than the average for other small-system users, reflecting the high level of importance DEC users place on this service.
- Exhibit VI-10 lists the percent of users that requires extended services from DEC and the premiums they would be willing to pay for those services. Although DEC users are rather price-sensitive with regard to premiums, it is interesting to note that a very high percentage of these users require extended services. For example, 77.6% of DEC users require remote diagnostics, compared to only 48% of all other small-system users.

EXHIBIT VI-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
DEC

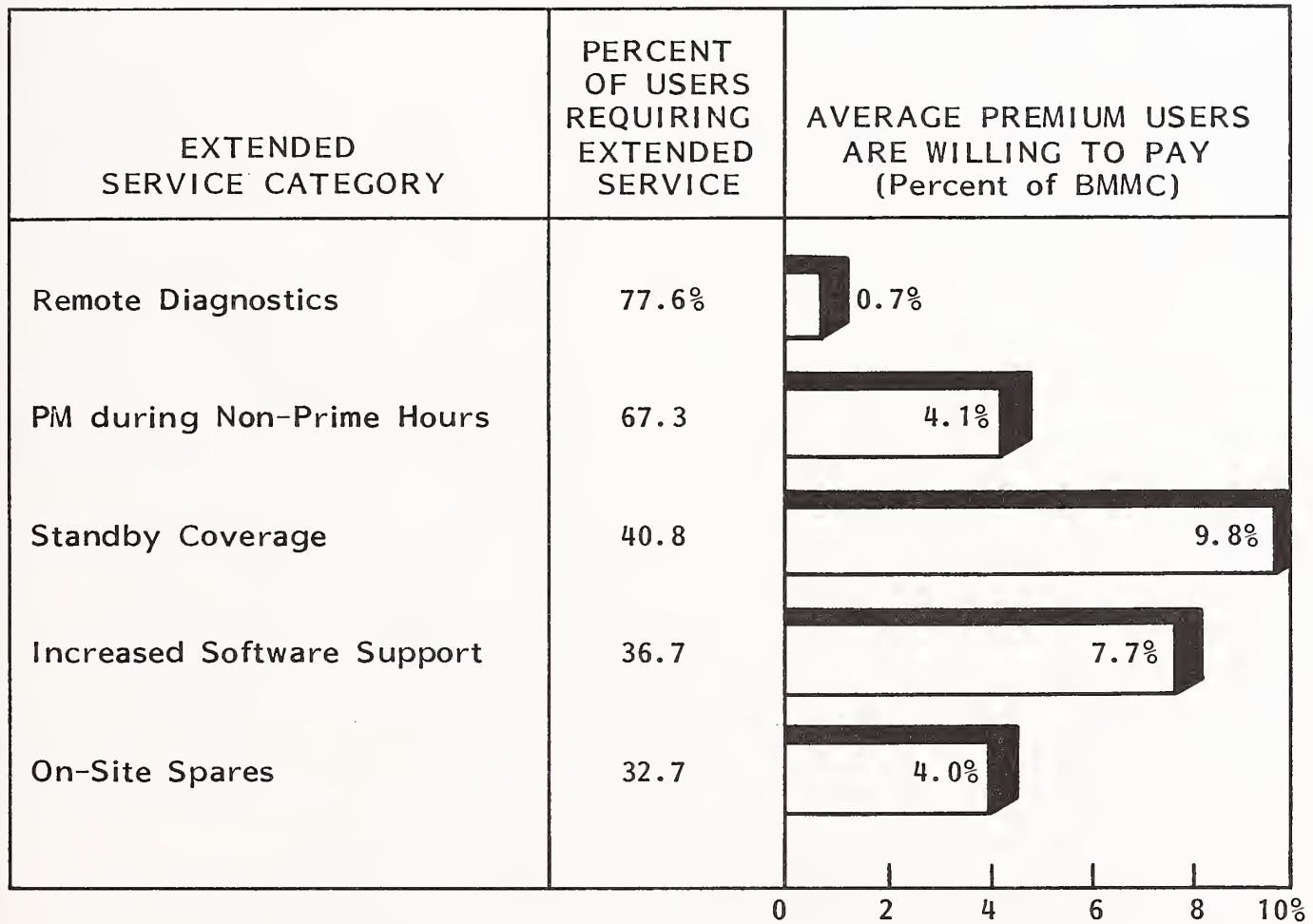
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.0
Satisfaction with Software Response Time	6.9
Satisfaction with Software Repair Time	6.6

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.6	0.7
Average Software Response Time (Hours)	10.1	8.1
Average Software Repair Time (Hours)	20.1	11.7

EXHIBIT VI-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: DEC



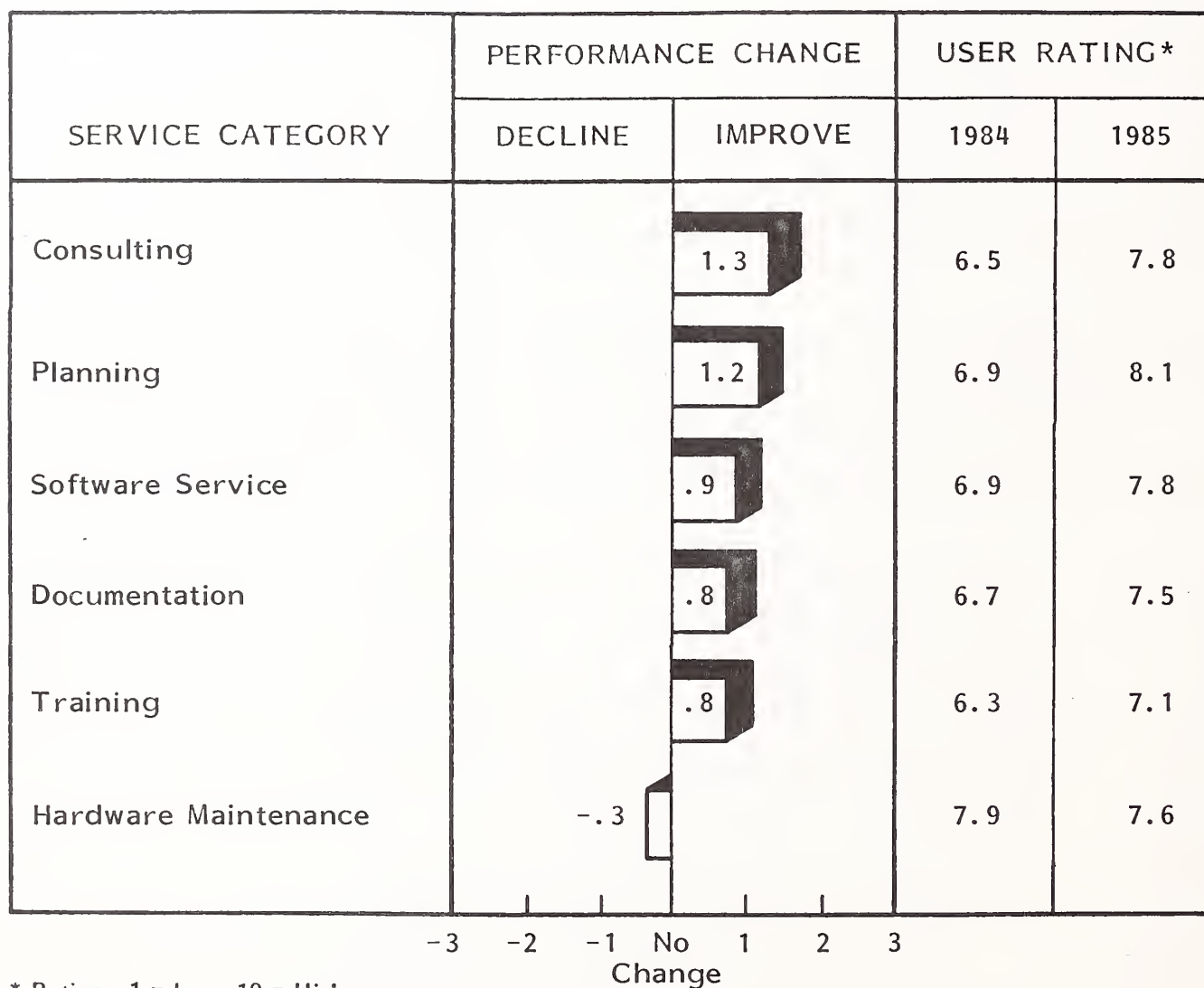
VII FOUR-PHASE

VII FOUR-PHASE

- A total of 21 Four-Phase users were interviewed by INPUT in 1985. These respondents reported an average installed age of the CPU of 4.4 years--the longest of all small-system users in this survey. Perhaps the stability of the installed base has resulted in improved service, because Four-Phase users were among the most satisfied in this year's survey.
- User ratings comparison of key service areas between 1984 and 1985 is shown in Exhibit VII-1. As the exhibit demonstrates, Four-Phase users reported dramatic improvements in almost all service categories, although there was a drop reported in the crucial area of hardware maintenance.
- Exhibit VII-2 demonstrates that parts availability and, to a lesser extent, a perceived drop in hardware engineer skill level have caused a major drop in user ratings of hardware service. INPUT believes that user attitudes about engineer skill level are greatly influenced by the parts availability issue--when parts are not available, users blame the engineer for equipment that cannot be repaired.
- Four-Phase has made substantial gains in systems software service. While other vendors service was falling far behind user expectations, Exhibit VII-3 demonstrates Four-Phase exceeding user expectations in a number of important system software service categories.

EXHIBIT VII-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: FOUR-PHASE



* Rating: 1 = Low, 10 = High

EXHIBIT VII-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: FOUR-PHASE

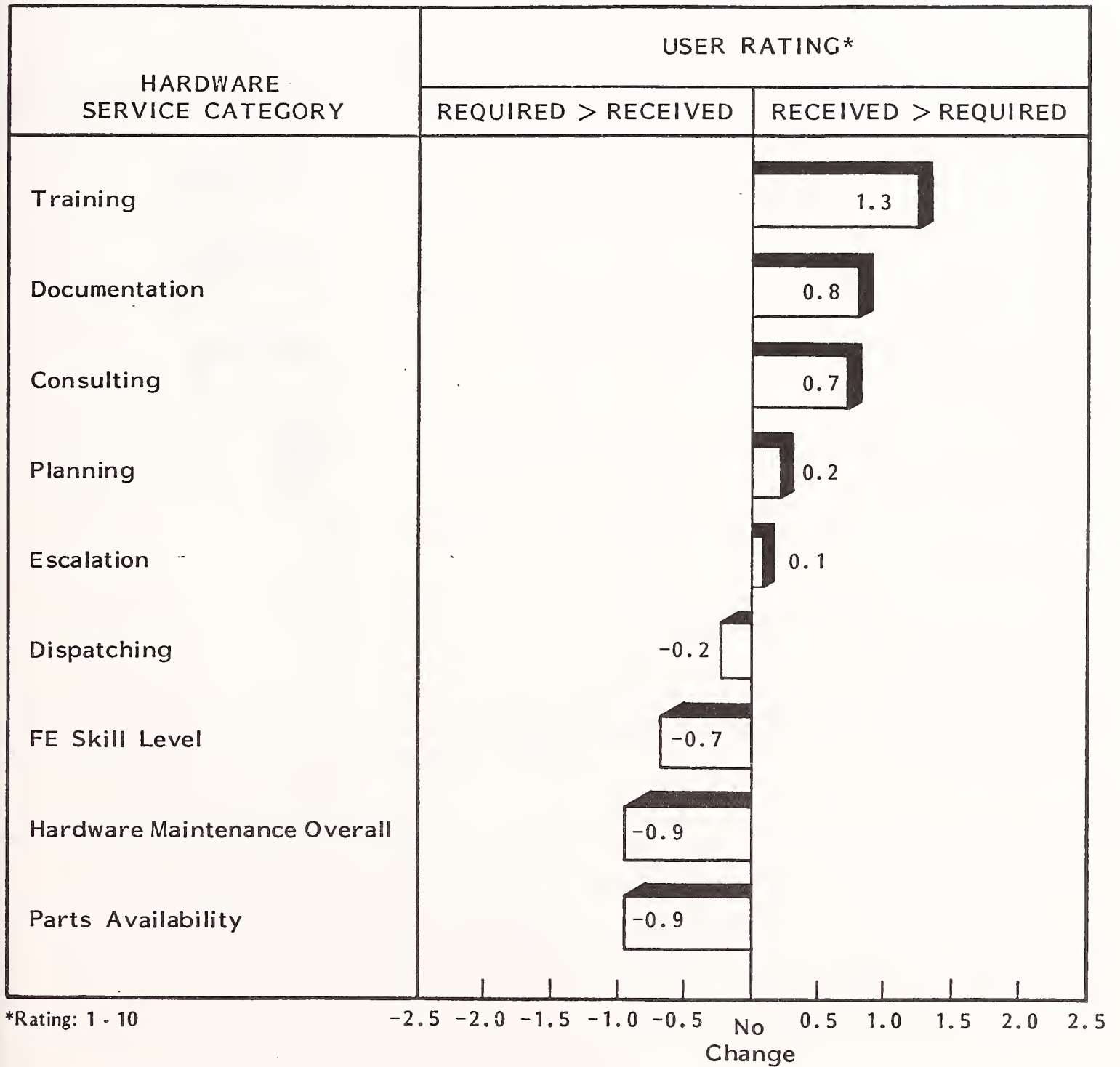
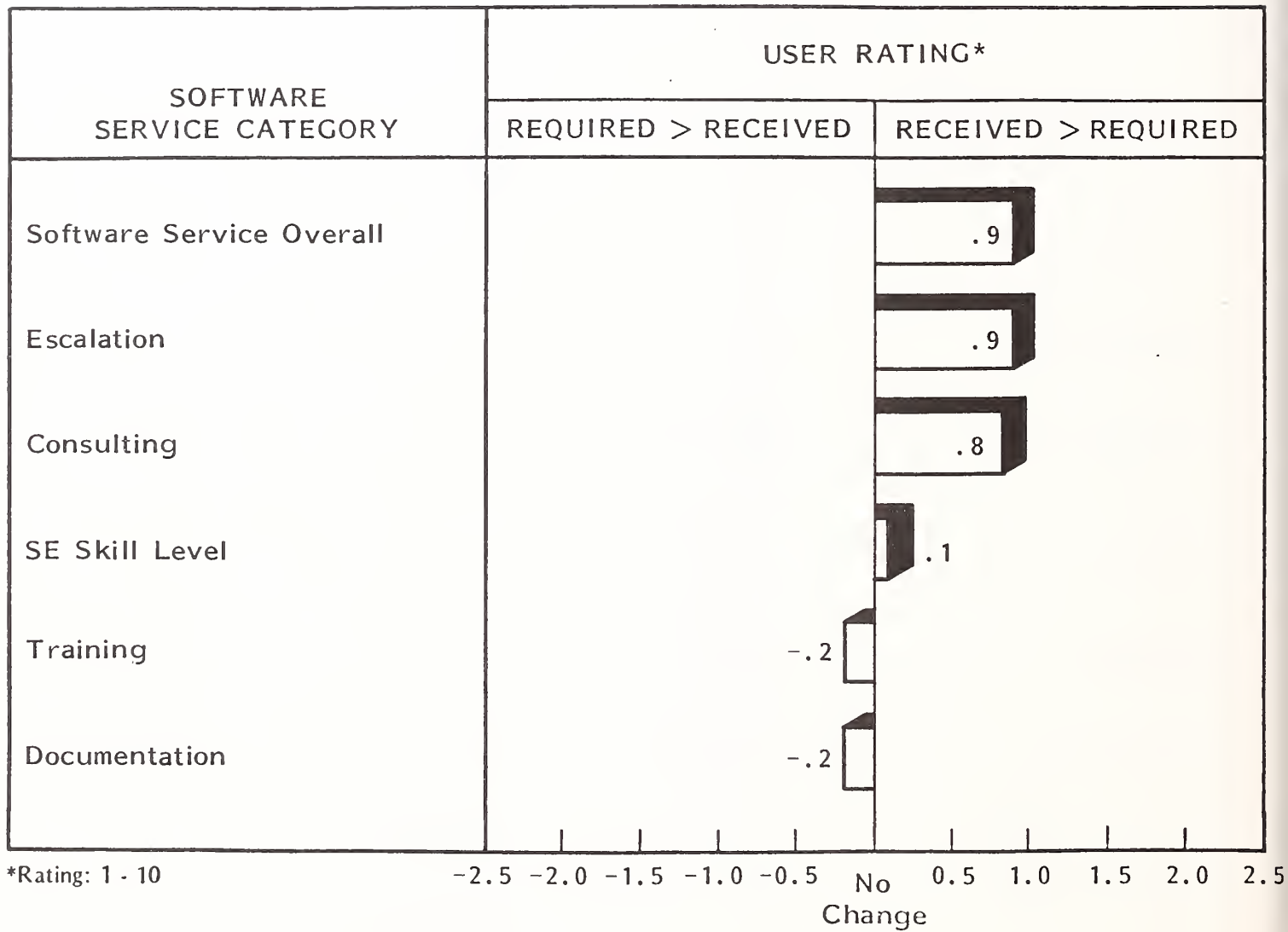


EXHIBIT VII-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: FOUR-PHASE



- User satisfaction with Four-Phase service is high, as demonstrated in Exhibits VII-4 and VII-5. As noted earlier, parts availability is the key hardware service which needs improvement. Software documentation presents a problem with only a 48% satisfaction rate, but this has not impacted overall satisfaction rates for software service.
- Four-Phase users' have lower service expectations for high priority services and higher expectations for low priority service than do other small-system users. The result is a well-integrated mix of services, as displayed in Exhibits VII-6 and VII-7. Unlike other users, Four-Phase users have not segmented their service requirements into two separate and distinct categories. This will prove very beneficial to Four-Phase because improvements in any one service are likely to have an effect on overall user satisfaction.
- Actual Four-Phase performance, as reported by users, is shown in Exhibits VII-8 and VII-9. Improvements in hardware service (see Exhibit VII-8) have been most noticeable.
 - Hardware interruptions per month dropped by over 50%.
 - System availability increased by almost 3% to 95.7%.
 - Average hardware response/repair time improved 23%.
 - Overall, Four-Phase users reported significantly fewer hardware interruptions and a much better response/repair time than the average small-system user.
- Although systems software support did not improve as dramatically as hardware support did, Four-Phase users did report an improved response/repair time as well as fewer software interruptions per month in 1985. Four-Phase response/repair time in 1985 was 57% better than average for all small-system vendors.

EXHIBIT VII-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
FOUR-PHASE

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
FE Skill Level	8.5	7.8	42.9
Hardware Maintenance Overall	8.5	7.6	42.9
Dispatching	8.2	8.0	61.9
Parts Availability	8.1	7.2	38.1
Planning	7.9	8.1	73.7
Escalation	7.1	7.2	57.9
Consulting	7.1	7.8	65.0
Documentation	6.7	6.5	61.9
Training	5.8	7.1	75.0


 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT VII-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: FOUR-PHASE

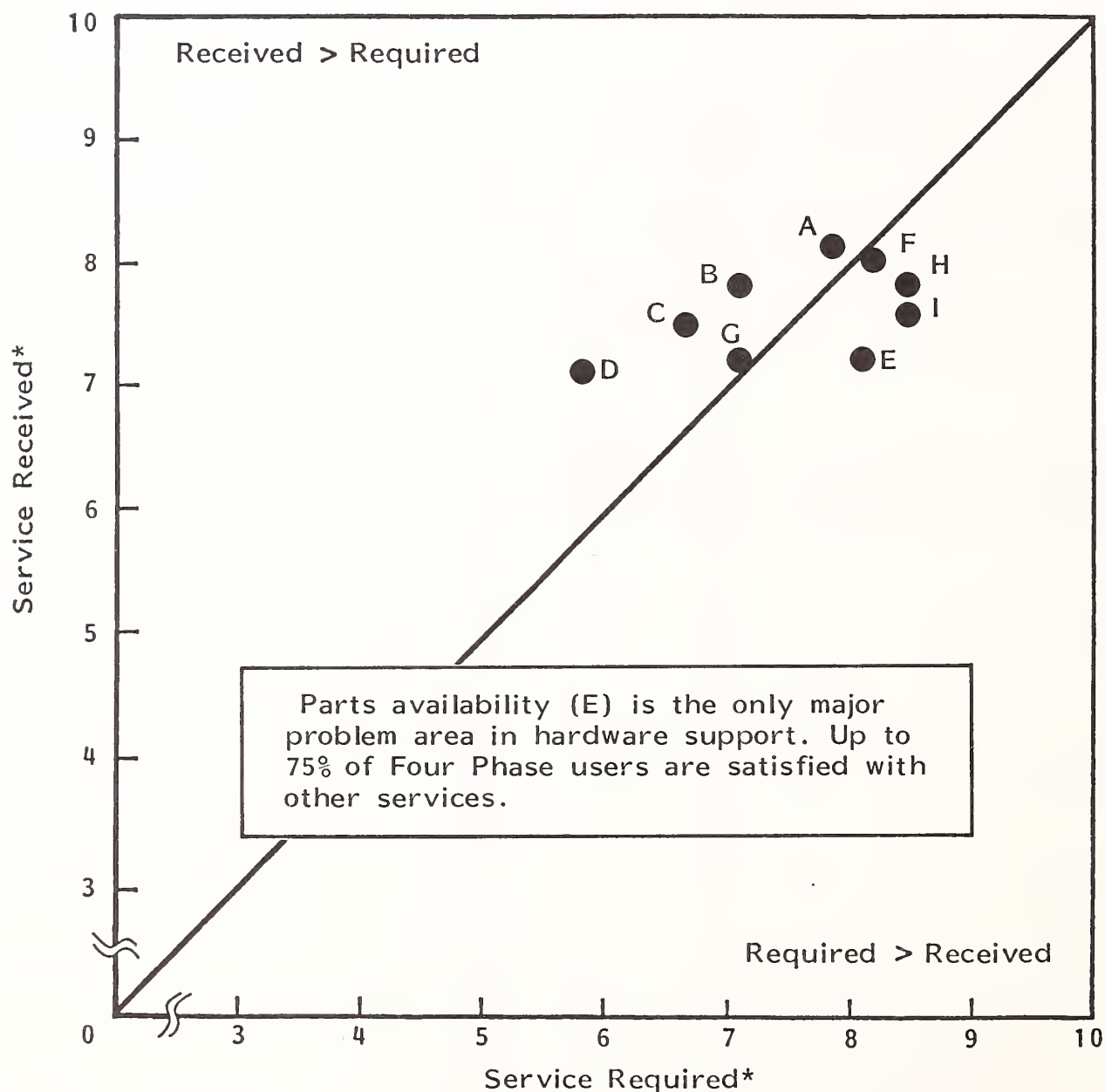
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	7.4	7.2	48.0%
SE Skill Level	7.1	7.2	57.0
Software Service Overall	6.9	7.8	72.0
Training	6.9	6.7	60.0
Consulting	6.2	7.4	65.0
Escalation	5.9	6.8	61.0

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT VII-6

FOUR-PHASE HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

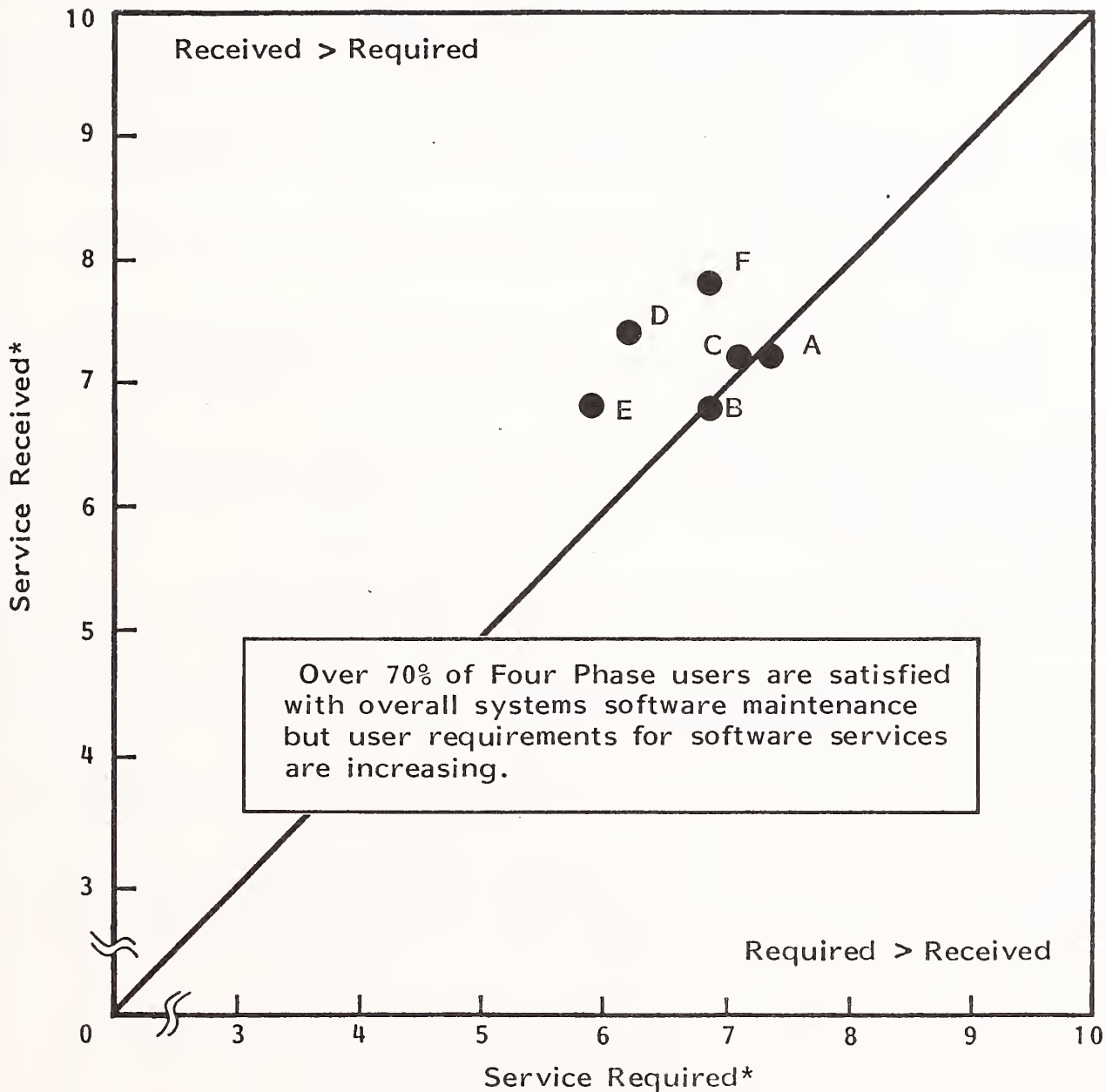


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT VII-7

FOUR-PHASE SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT VII-8

HARDWARE SERVICE COMPONENT DATA:
FOUR-PHASE

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.0
Satisfaction with System Availability	8.1
Satisfaction with Response Time	8.2
Satisfaction with Repair Time	7.8

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.6	0.7
Average System Availability (Percent)	93.4%	95.7%
Average Hardware Response Time (Hours)	2.9	2.9
Average Hardware Repair Time (Hours)	3.3	1.9

EXHIBIT VII-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA: FOUR-PHASE

SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.1
Satisfaction with Software Response Time	7.7
Satisfaction with Software Repair Time	7.3

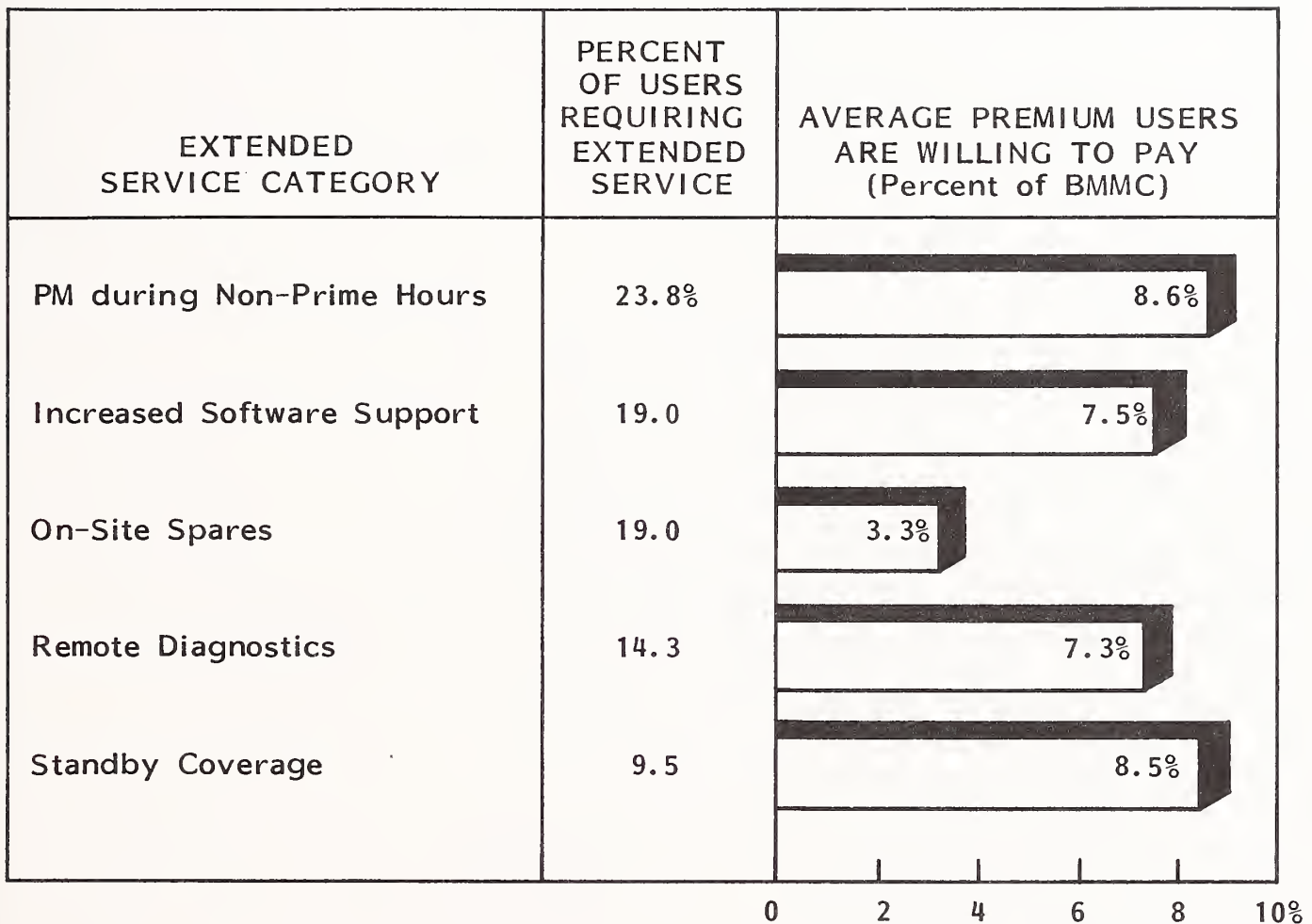
*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.6	0.5
Average Software Response Time (Hours)	5.9	3.2
Average Software Repair Time (Hours)	14.7	11.5

- Because Four-Phase users are so satisfied with the support they are receiving, it is not surprising that they require few additional services, as shown in Exhibit VII-10. INPUT does not believe that this is a case of users being concerned about price, but rather that users simply do not require any additional services.
- Clearly, if Four-Phase can continue the level of service they now offer, user satisfaction with service will not be a major concern. However, Four-Phase's installed base is quite old (at least the random sample in this study) and the company will be forced to deal with very high user service expectations as new machines are introduced.

EXHIBIT VII-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: FOUR-PHASE



VIII HEWLETT-PACKARD

VIII HEWLETT-PACKARD

- Hewlett-Packard 3000 users (25 of whom were interviewed for this report) continue to report extremely high satisfaction rates in 1985, placing HP at or near the top in most service categories. As with last year, the hardware component of service continues to generate the highest satisfaction levels, although in 1985 users reported moderately high satisfaction rates with system software support as well.
- Exhibit VIII-1 demonstrates that user ratings of HP service have remained at a stable level since 1984. While overall service has not improved or declined dramatically between 1984 and 1985, INPUT believes that HP has provided a consistently high level of service which accurately reflects user's needs.
- HP made significant gains in hardware training, documentation consulting, and planning, as shown in Exhibit VIII-2. HP provides significantly more service in these areas than is required by the company's users. On the other hand, parts availability and FE skill are problem areas.
- In systems software support (see Exhibit VIII-3), improving software documentation should be a major goal. Users report the level of documentation required falls far short of the level received.
- HP user satisfaction rates with the various components of service are shown in Exhibits VIII-4 and VIII-5. As Exhibit VIII-4 demonstrates, the majority of HP users are satisfied with almost all hardware services. It should be noted,

EXHIBIT VIII-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: HEWLETT-PACKARD

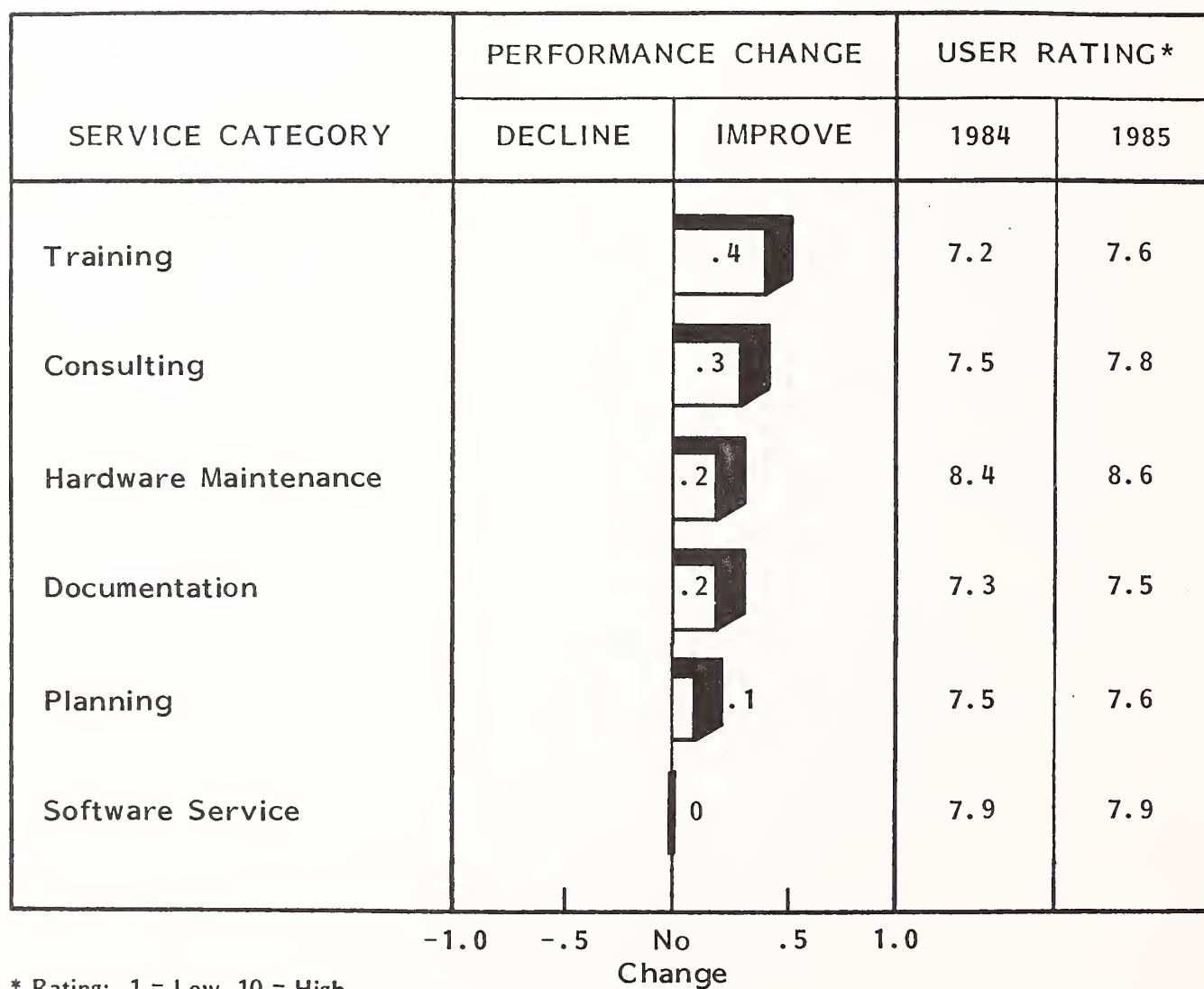


EXHIBIT VIII-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: HEWLETT-PACKARD

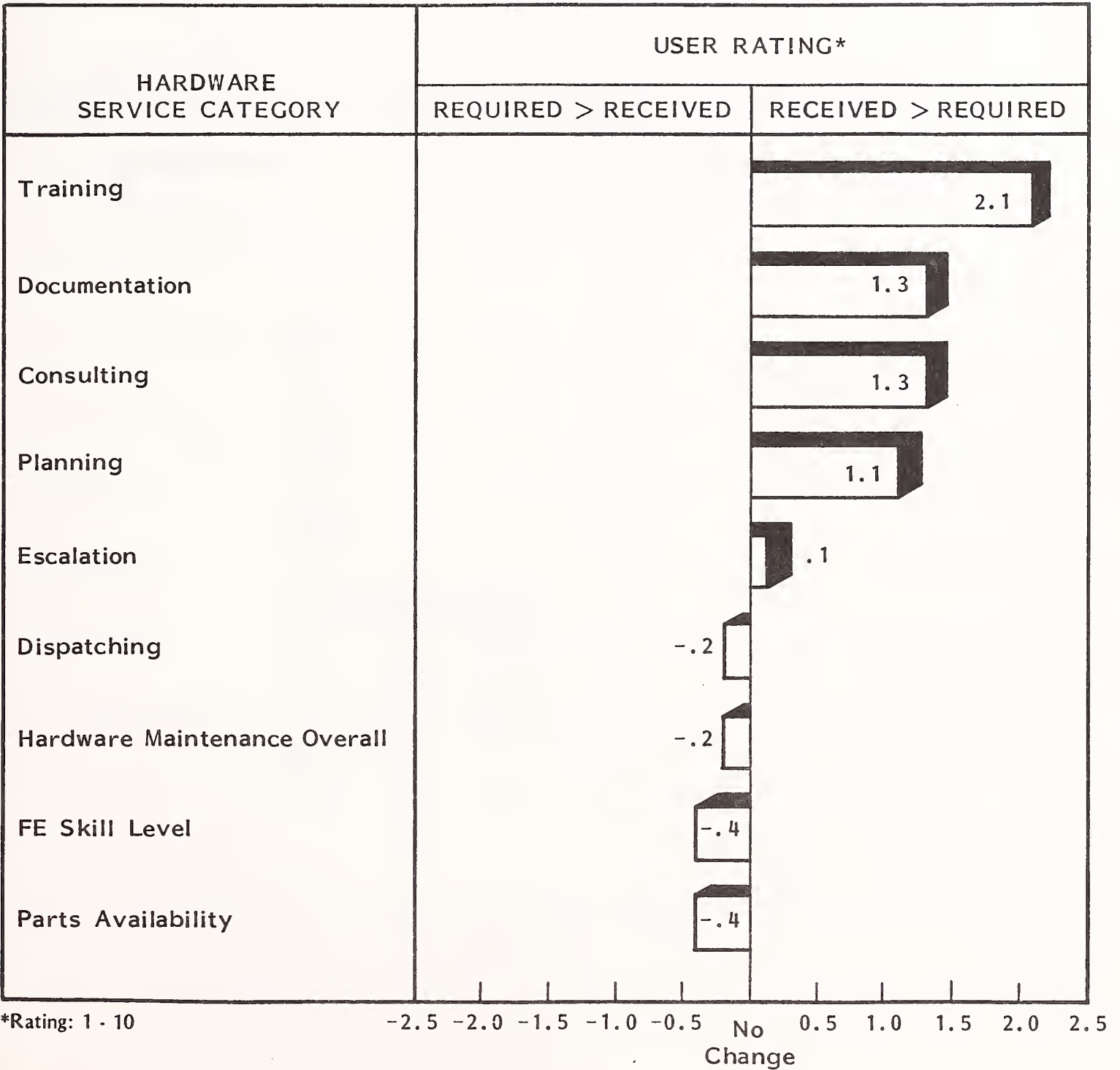


EXHIBIT VIII-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: HEWLETT-PACKARD

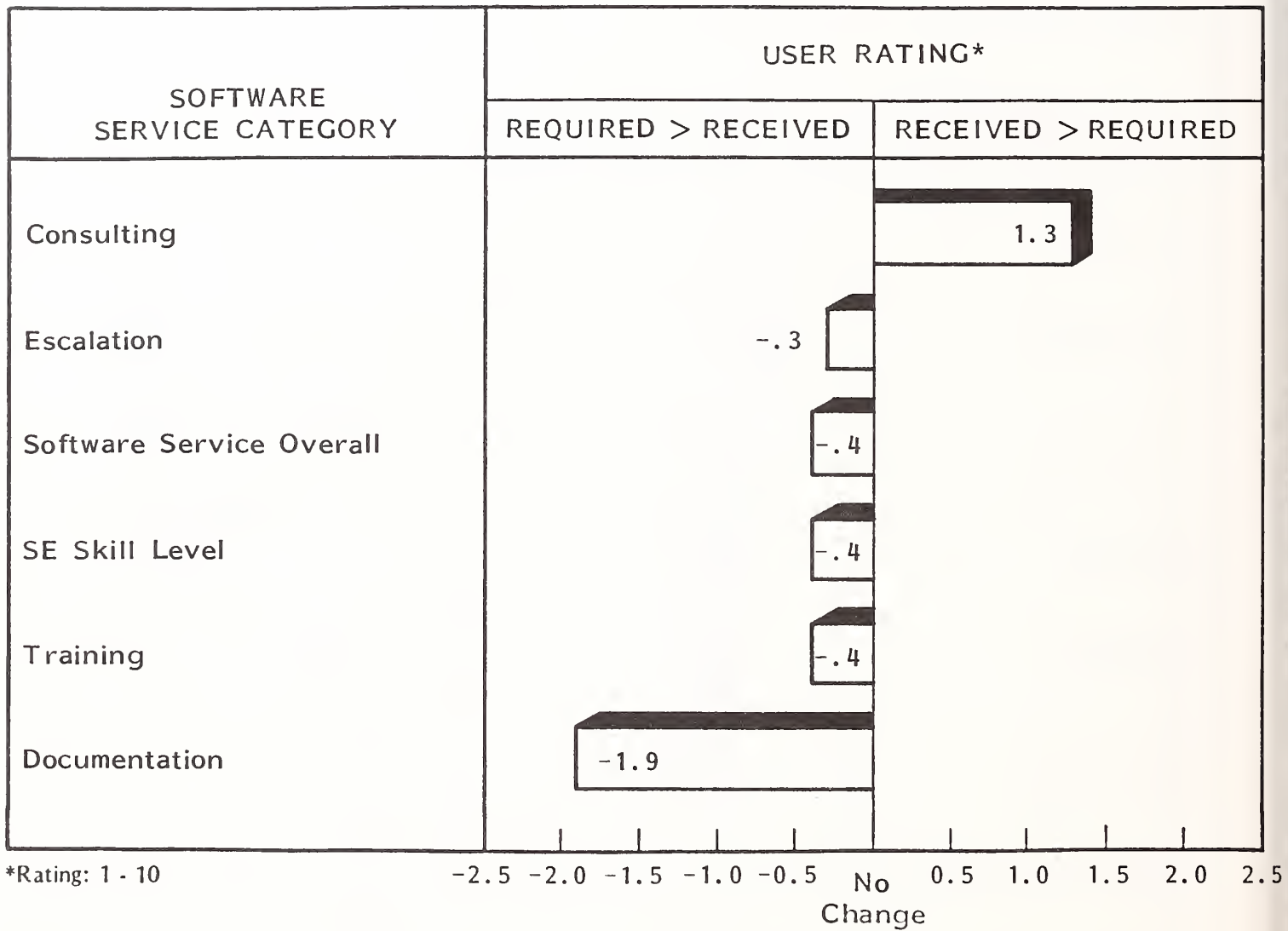



EXHIBIT VIII-4

1985 USER SATISFACTION WITH HARDWARE SERVICE: HEWLETT-PACKARD

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
FE Skill Level	9.2	8.8	41.7
Hardware Maintenance Overall	8.8	8.6	66.7
Parts Availability	8.6	8.2	72.0
Dispatching	8.5	8.3	73.9
Escalation	8.4	8.5	79.2
Planning	6.5	7.6	68.8
Consulting	6.5	7.8	72.2
Documentation	6.2	7.5	84.2
Training	5.5	7.6	94.4

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT VIII-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE:
HEWLETT-PACKARD

SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	9.0	7.1	18.2%
Software Service Overall	8.3	7.9	59.1
SE Skill Level	8.2	7.8	54.5
Training	8.0	7.6	52.6
Escalation	7.9	7.6	66.7
Consulting	6.3	7.6	82.4

 A majority of users are dissatisfied with service.

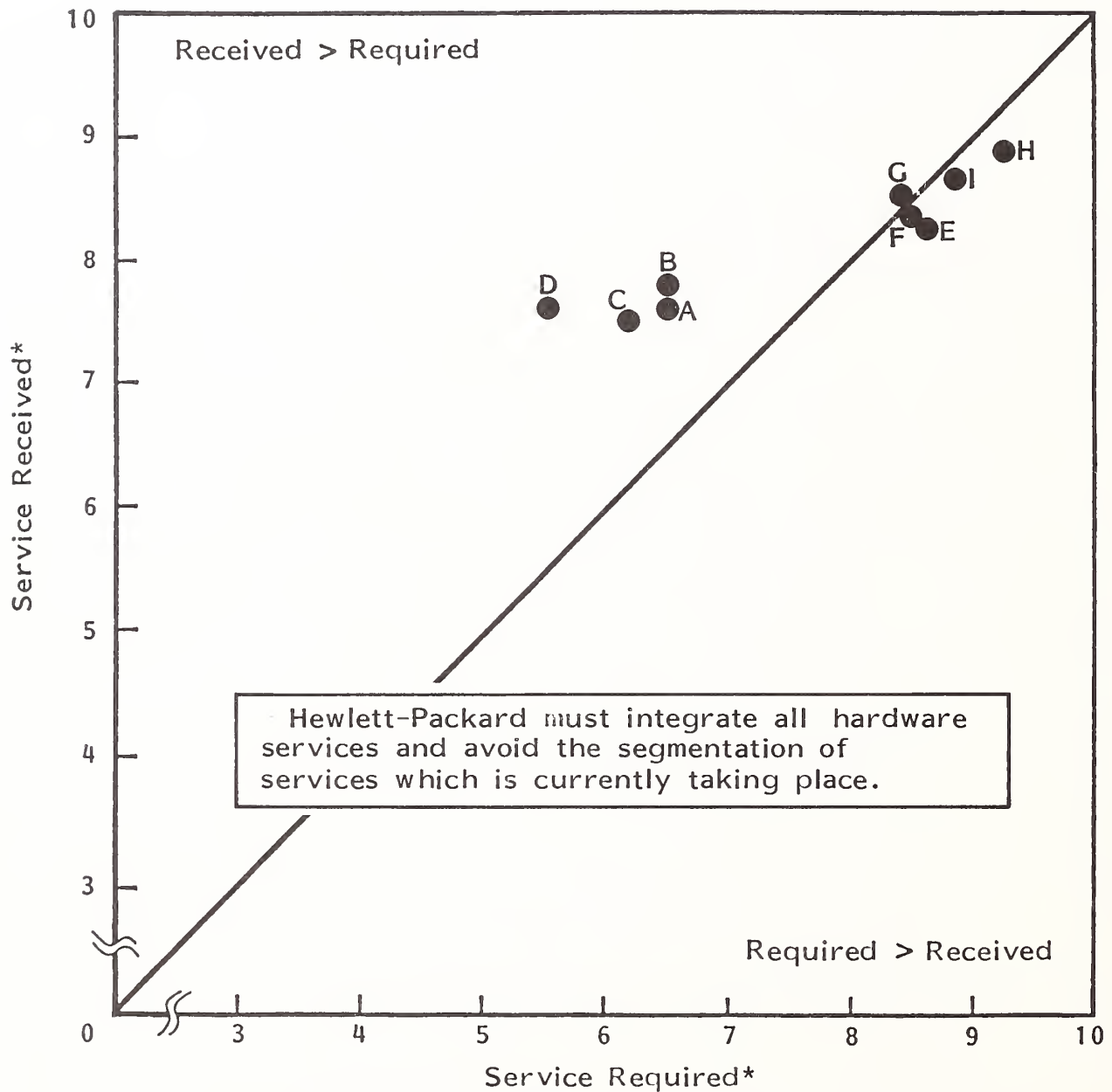
*Rating: 1 = Low, 10 = High

however, that HP users have indicated that they have a lower expectation for service than most other small-system users. Only in the areas of FE skill level and escalation do the HP user requirements even equal the average requirement for all small-system users. In all other areas, HP user requirements for hardware service are lower than the average.

- Hewlett-Packard has the highest overall satisfaction rate with system software support of all small-system vendors. As Exhibit VIII-5 demonstrates, most HP users are satisfied with every software support category, except for documentation (which is also the category with the highest user requirement). INPUT believes that the company must improve software documentation in order to provide a flexible menu of software support options to its users. Ultimately, as the company attempts to segment its user base, being able to offer this type of menu will be extremely useful.
- Exhibits VIII-6 and VIII-7 plot user requirements for hardware and software services against the level of service actually received by the user. In hardware support, a clear segmentation of user requirements is forming. Low priority services, such as planning and consulting, are considered separate and apart from high priority services, such as FE skill level and parts availability. INPUT believes that HP should close the perceived gap between the two groups of services.
 - As users downgrade the priority of any service, they are less willing to pay for that service.
 - Increased segmentation will result in users having service satisfaction on just one or two "key services"--services which will change periodically, resulting in a perpetually dissatisfied user base.
- Surprisingly, HP's actual service performance--particularly hardware service--is just slightly better than average despite very high levels of user satisfaction. Exhibit VIII-8 demonstrates improvements made in the number of hard-

EXHIBIT VIII-6

HEWLETT-PACKARD HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

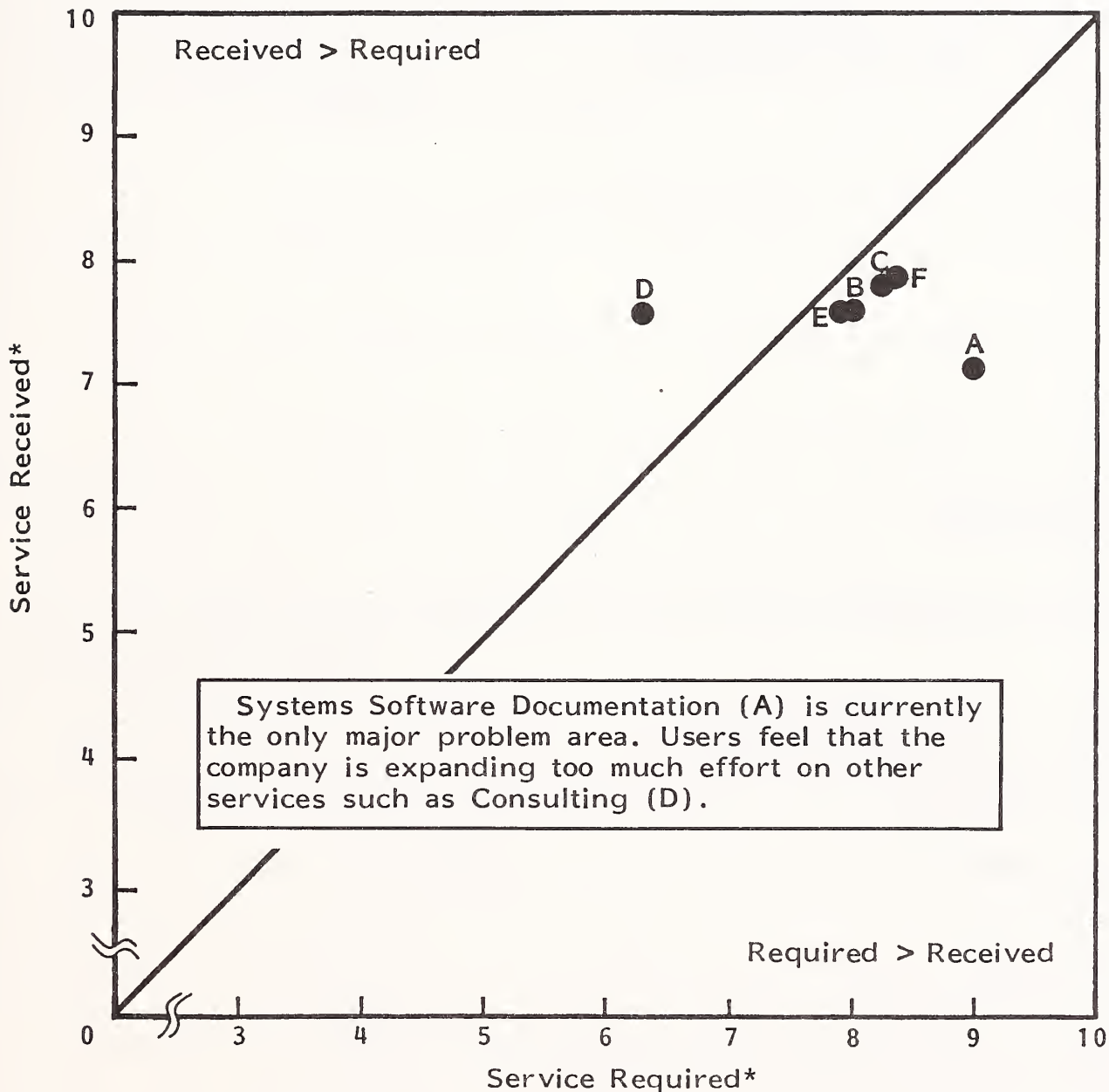


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT VIII-7

HEWLETT-PACKARD SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT VIII-8

HARDWARE SERVICE COMPONENT DATA:
HEWLETT-PACKARD

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.5
Satisfaction with System Availability	9.2
Satisfaction with Response Time	8.4
Satisfaction with Repair Time	8.4

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.2	0.8
Average System Availability (Percent)	93.4%	96.8%
Average Hardware Response Time (Hours)	2.7	4.3
Average Hardware Repair Time (Hours)	3.8	3.0

ware interruptions per month, improved system availability, and average repair time. However, total response/repair time increased in 1985 and was virtually the same as for all small-system vendors. Overall system availability of the HP 3000 was reported to be 96.8, just slightly above the all system average.

- System software support performance, shown in Exhibit VIII-9, is significantly better than the average; however, because HP user expectations are high, overall satisfaction is lower than average. HP users reported major improvement in systems software support:
 - HP has one of the lowest number of system software interruptions per month in the industry.
 - Average software response time improved 72% in 1985.
 - Average software repair time improved 31% in 1985.
- While user satisfaction with HP service will result in a number of benefits to the company, it will also affect user attitudes toward paying premiums for extended or nonstandard services as demonstrated in Exhibit VIII-10. While a large number of users require extended services, such as remote diagnostics and PM during non-prime hours, these users typically feel they should pay small, if any, premiums. In addition, 60% of HP users said they expected a discount if they participated in the support of their equipment.

EXHIBIT VIII-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
HEWLETT-PACKARD

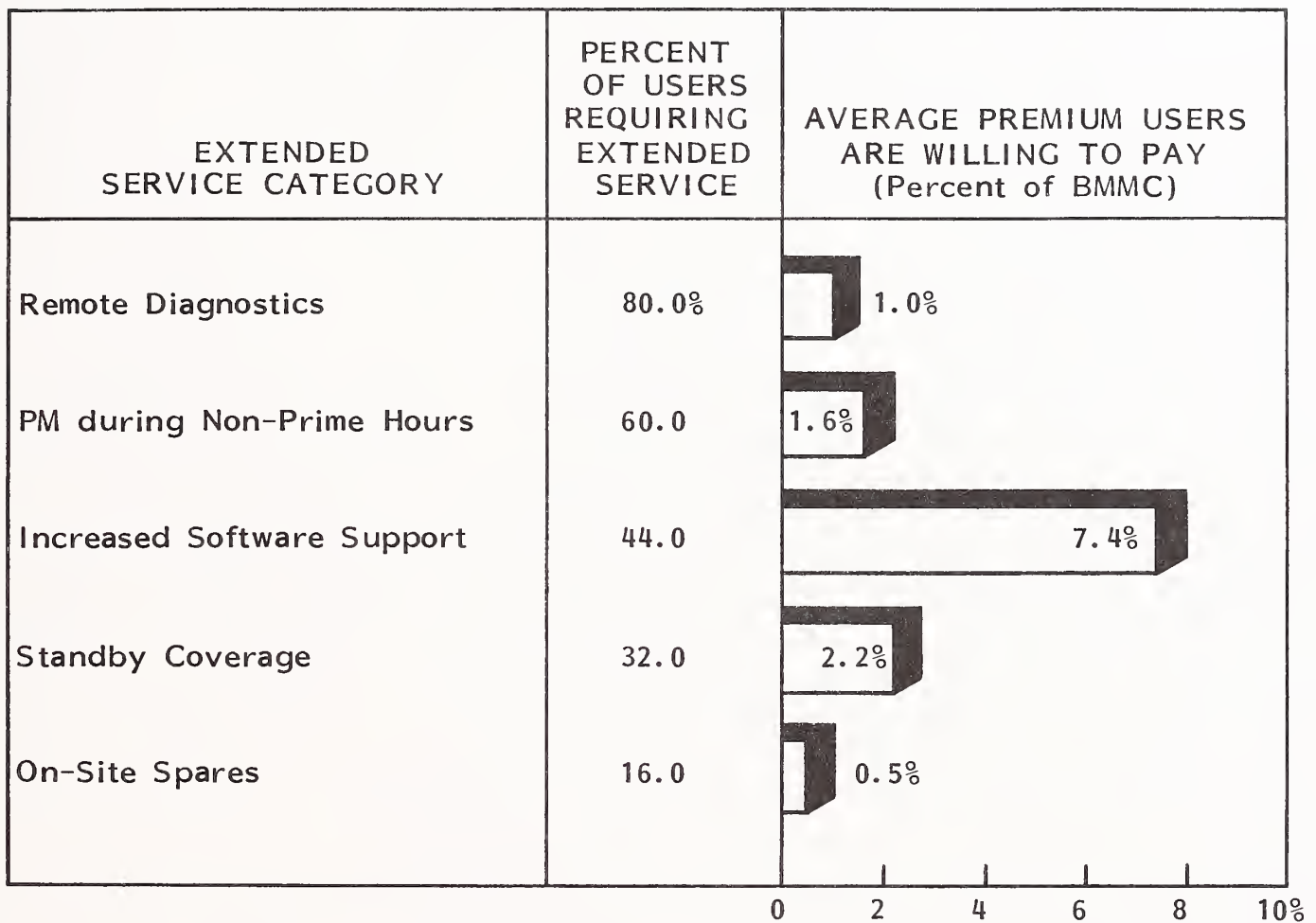
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.1
Satisfaction with Software Response Time	7.2
Satisfaction with Software Repair Time	6.8

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.5	0.3
Average Software Response Time (Hours)	10.7	3.0
Average Software Repair Time (Hours)	13.7	9.4

EXHIBIT VIII-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: HEWLETT-PACKARD



IX HONEYWELL

IX HONEYWELL

- Twenty Honeywell DPS 6 users were interviewed for this report and these users reported that their CPU's had been installed for an average of 3.2 years--just about the average for all small-system users.
- Overall, Honeywell user satisfaction with service was quite high despite users reporting a performance decline in nearly every service category, as shown in Exhibit IX-1. This, coupled with the dissatisfaction of a majority of Honeywell users with hardware and software support last year, indicates the turnaround in user satisfaction is related both to improved vendor performance in selected areas and lower user expectations for service.
- Exhibits IX-2 and IX-3 demonstrate that, for most services, Honeywell is not meeting user expectations. As with most small-system users, Honeywell users require better trained and supported FE's, better parts availability, and improved software documentation. However, in some other key areas of service, Honeywell user service requirements have declined. For example:

<u>User Requirement</u>	<u>1984</u>	<u>1985</u>
Overall Hardware Maintenance	9.4	8.6
Overall Software Maintenance	7.6	7.4
Documentation	7.3	5.6

EXHIBIT IX-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: HONEYWELL

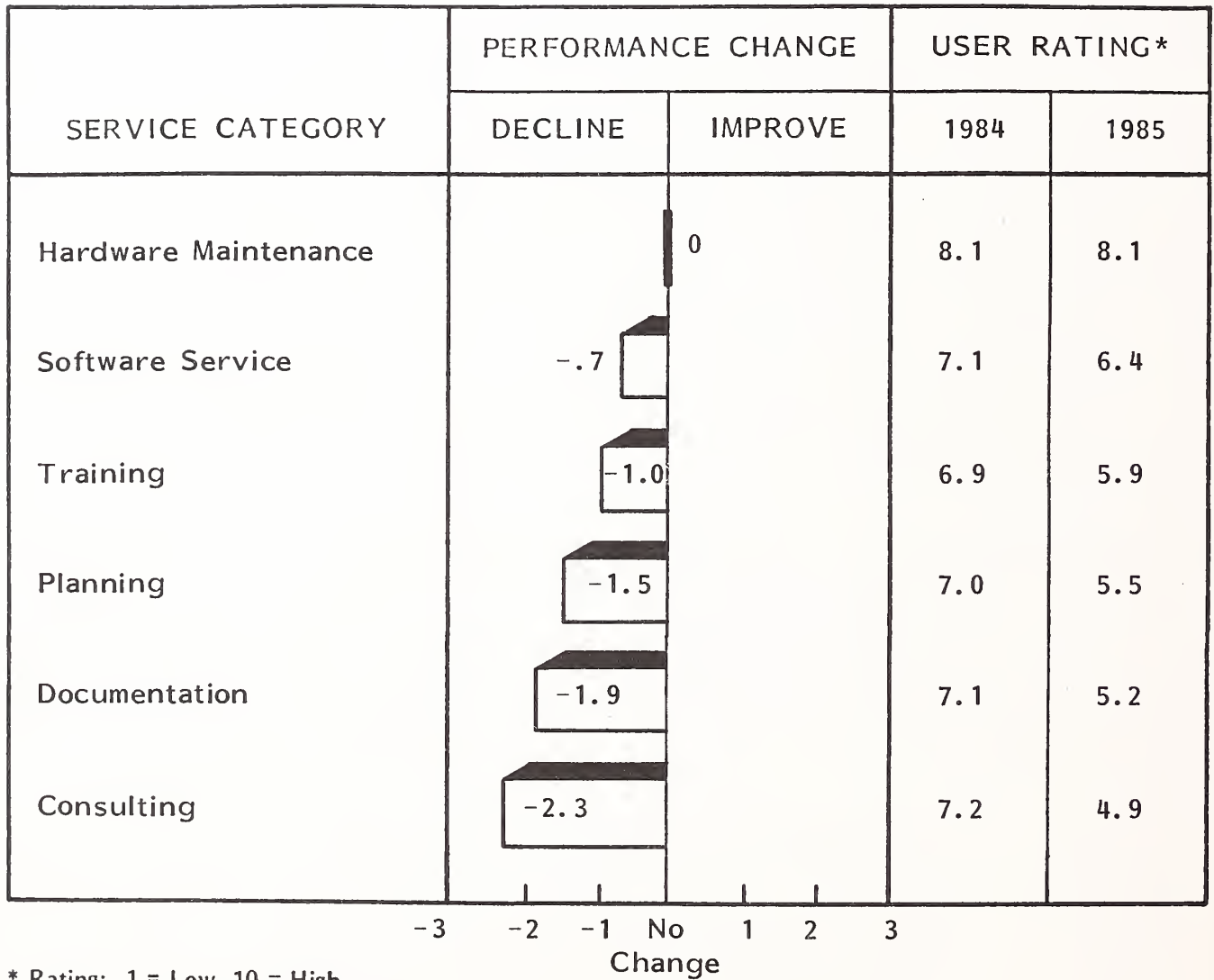


EXHIBIT IX-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: HONEYWELL

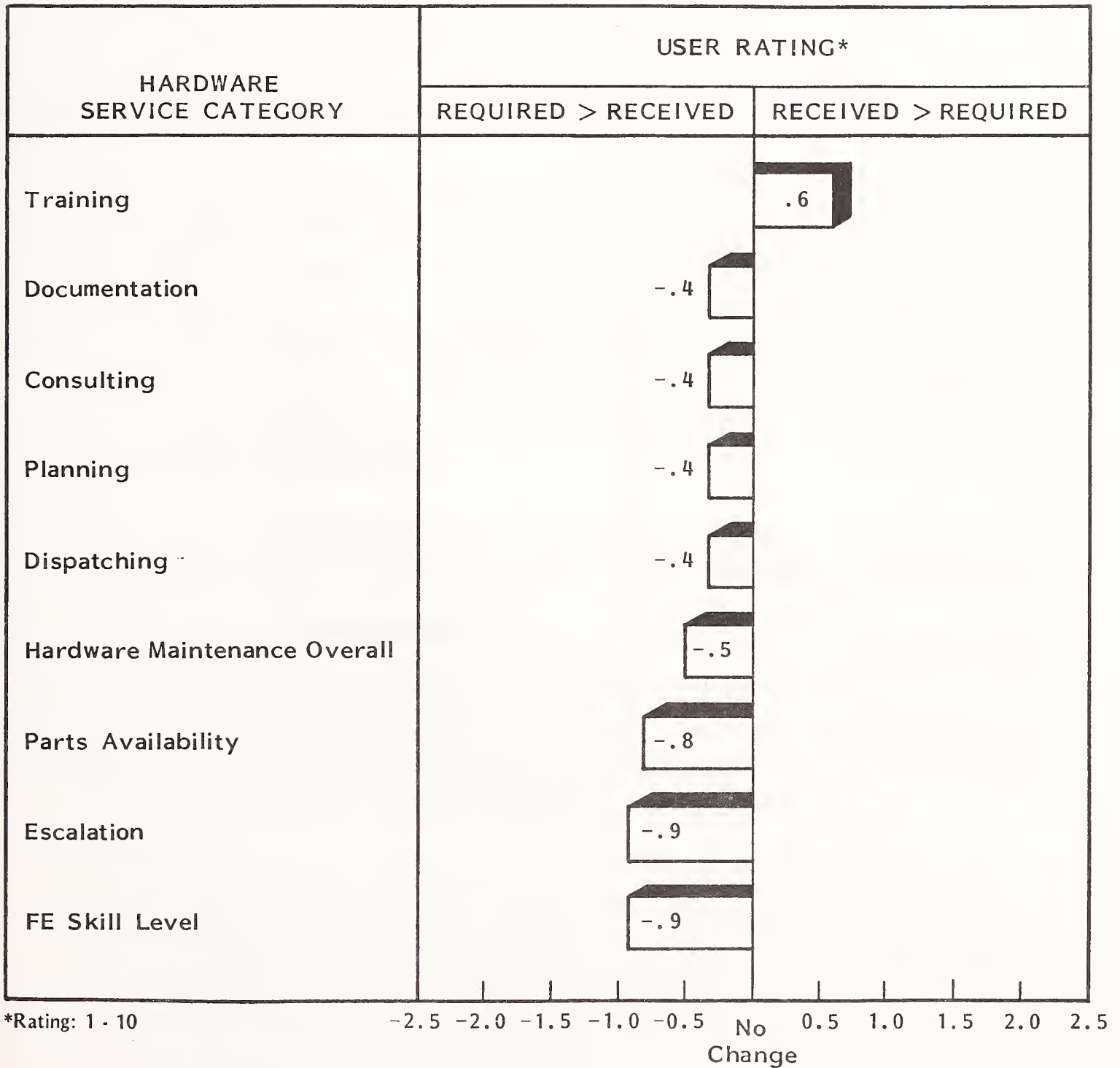
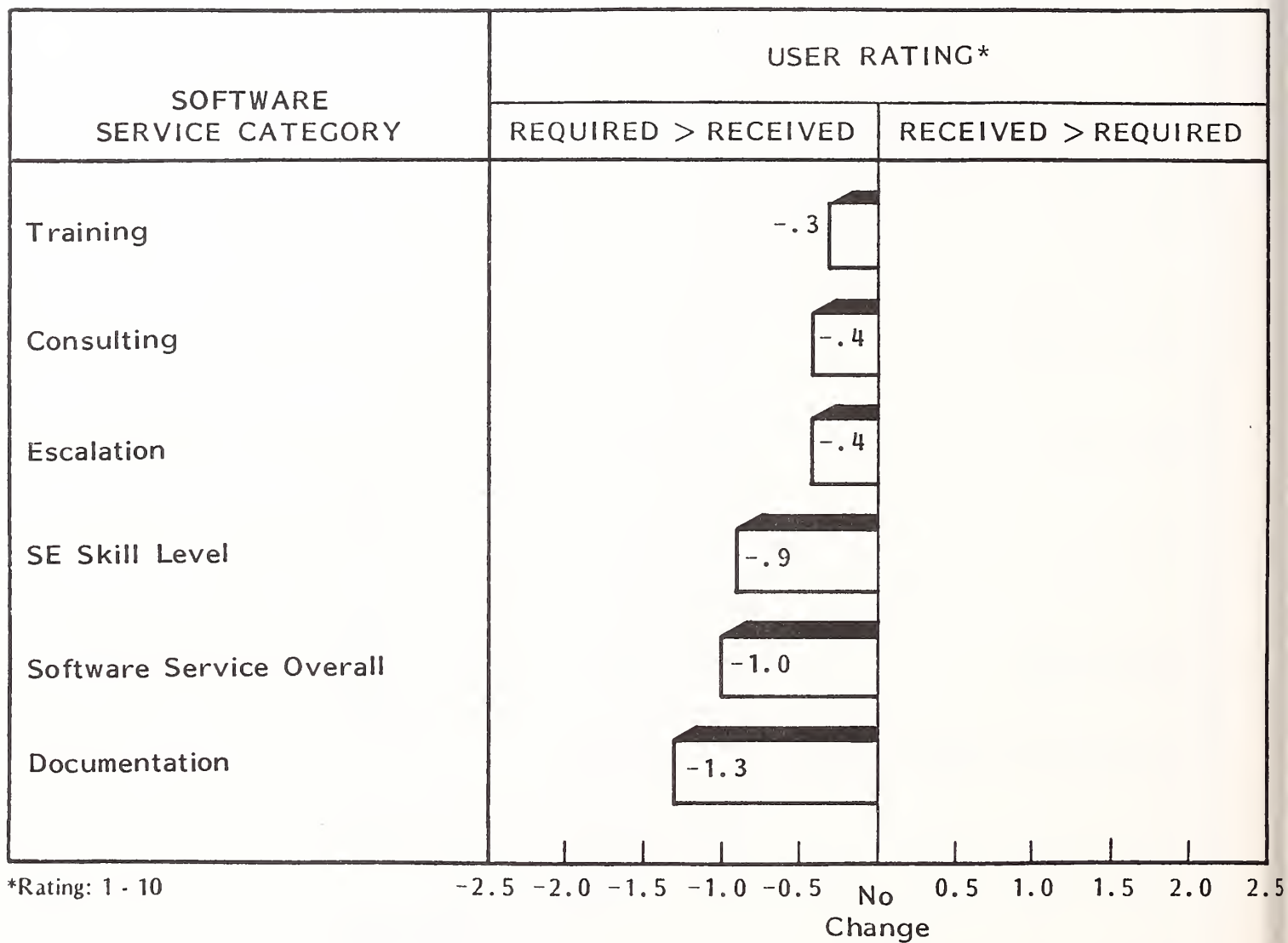


EXHIBIT IX-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: HONEYWELL



- While user expectations for service were declining, vendor performance in such areas as hardware maintenance was improving. As a result of this combined change, overall user satisfaction with hardware maintenance has stayed very high, as shown in Exhibit IX-4. For example, in 1984 only 37% of DPS 6 users were satisfied with hardware support, but that number increased to 67% in 1985.
- In the area of systems software support, however, changes have not been nearly so dramatic. In fact, overall user satisfaction with software support from Honeywell has remained stagnant at 30%, as shown in Exhibit IX-5.
- One of the major problems Honeywell must face in software support is improving the documentation. Like many user groups, Honeywell users are somewhat hesitant about participating in software support without proper training and support. Clearly, training is not a problem, but support, in the form of adequate documentation, is preventing many users from becoming involved in software support. This, in turn, is hurting overall user attitudes about software service, particularly when Honeywell cannot meet initial user expectations for service.
- Exhibits IX-6 and IX-7 demonstrate user requirements for services as opposed to the level of service provided by Honeywell. Exhibit IX-6 is particularly instructive because it shows a well developed segmentation of hardware service. One of the main reasons Honeywell has been able to improve user satisfaction with DPS 6 service is that the company has concentrated on those services most important to its users. This has been particularly effective in re-establishing service credibility, but now Honeywell must emphasize these low priority services as a potential source of added revenue.
- User satisfaction with software maintenance overall (see F in Exhibit IX-7) is currently just under 30%, despite the fact that most other software service components have been readily accepted by Honeywell users. INPUT believes that there are three causes for this low satisfaction rating.

EXHIBIT IX-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
HONEYWELL

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Dispatching	8.9	8.5	89.5%
Parts Availability	8.8	8.0	70.0
FE Skill Level	8.7	7.8	55.6
Hardware Maintenance Overall	8.6	8.1	66.7
Escalation	8.0	7.1	61.1
Planning	5.9	5.5	69.2
Documentation	5.6	5.2	42.9
Training	5.3	5.9	78.6
Consulting	5.3	4.9	41.7

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT IX-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: HONEYWELL

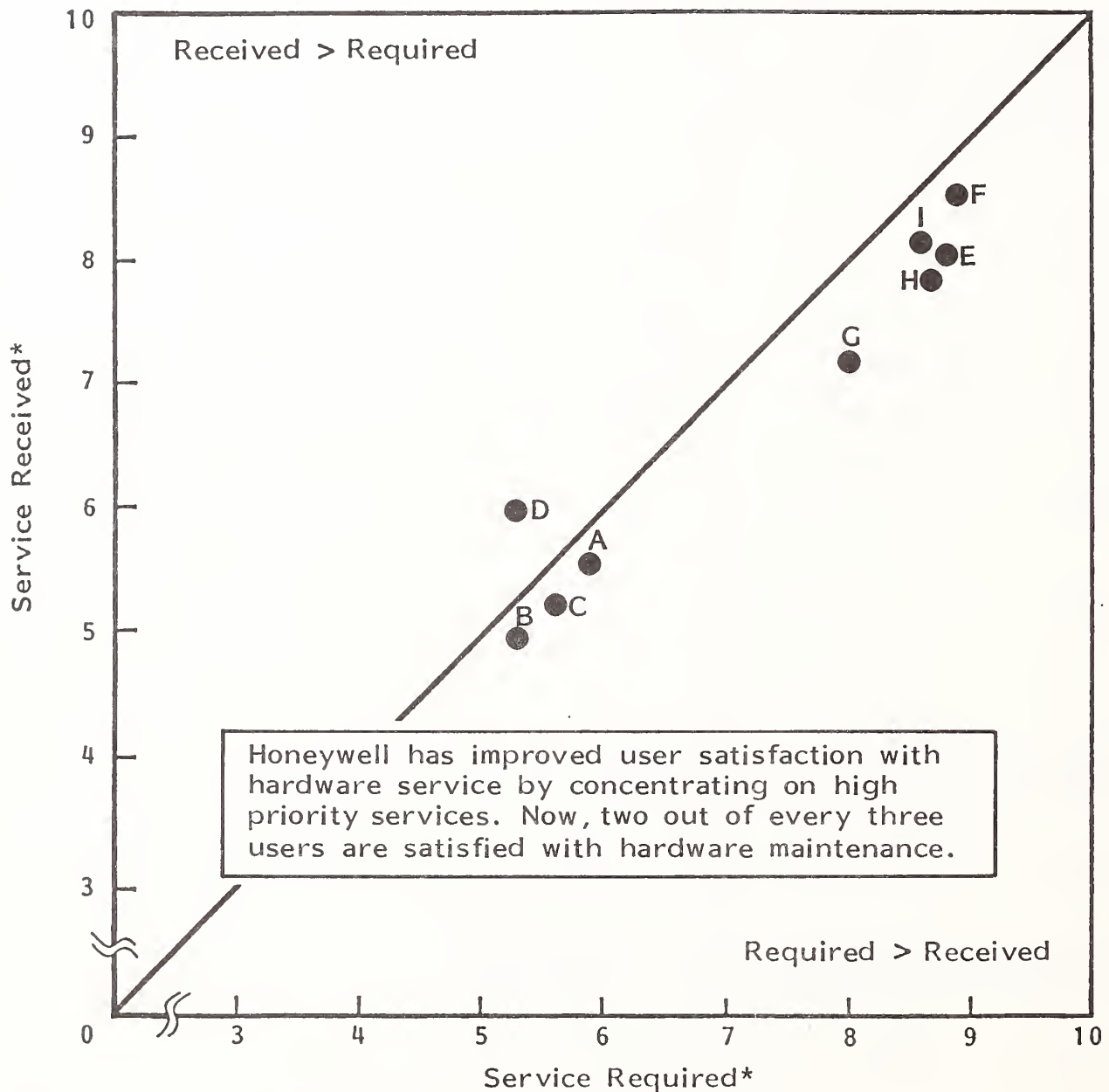
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	8.2	6.9	36.8%
Software Service Overall	7.4	6.4	29.4
Training	7.1	6.8	58.8
SE Skill Level	6.6	5.7	50.0
Escalation	6.5	6.1	62.5
Consulting	6.2	5.8	60.0

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT IX-6

HONEYWELL HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

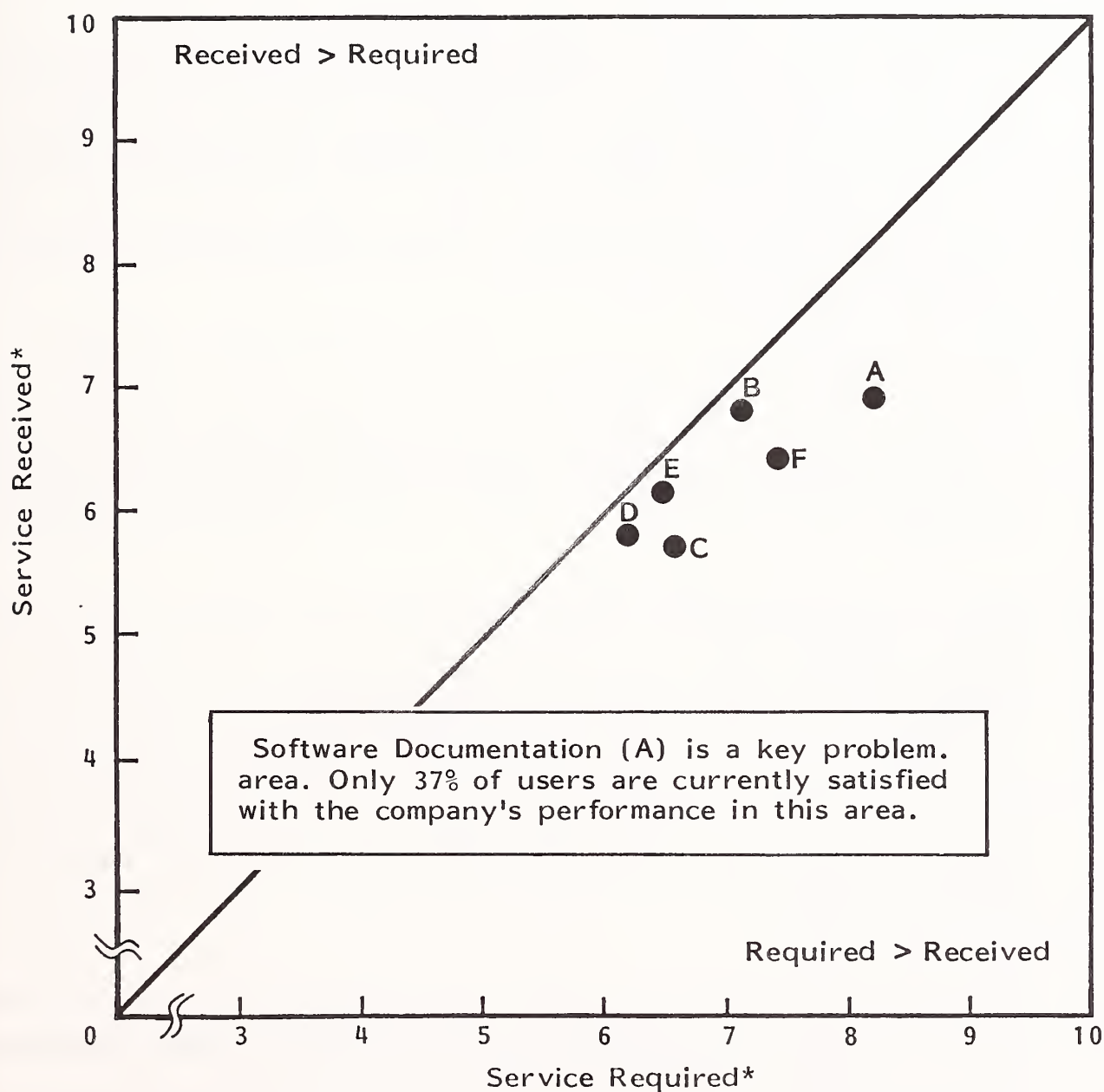


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT IX-7

HONEYWELL SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

- The number of software interruptions per month is increasing.
 - Software repair times are not improving.
 - Software documentation is poor so most users cannot correct the problems themselves.
-
- Honeywell's actual service performance has improved, as shown in Exhibits IX-8 and IX-9. Overall system availability has increased 5% primarily as a result of improvements made in hardware repair time (improved 36%) and software response time (improved 48%). Total hardware repair time (including response and repair time) was 27% better than the average for all small-system vendors.
 - Honeywell systems software support performance was marred by a large number of software interruptions per month (0.9, 33% greater than the small-system average) and a high repair time average (16.8 hours, 7% higher than average).
 - Primarily because users are not receiving the level of software support they desire, they are willing to pay above-average premiums for this service, as shown in Exhibit IX-10. Honeywell users are willing to pay over twice the premiums other small-system users are willing to pay for increased software support. However, in other areas, such as remote diagnostics or on-site spares, Honeywell users are much more price-sensitive than the average small-system user.
 - INPUT believes that Honeywell users will remain satisfied with the current level of hardware support, but that additional resources must be directed toward the software support area. To lessen the burden, Honeywell users are willing to finance improvements in software support through increases in license and maintenance fees.

EXHIBIT IX-8

HARDWARE SERVICE COMPONENT DATA: HONEYWELL

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.2
Satisfaction with System Availability	8.7
Satisfaction with Response Time	8.7
Satisfaction with Repair Time	8.5

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.8	1.8
Average System Availability (Percent)	91.5%	96.2%
Average Hardware Response Time (Hours)	2.8	2.7
Average Hardware Repair Time (Hours)	4.3	2.8

EXHIBIT IX-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA: HONEYWELL

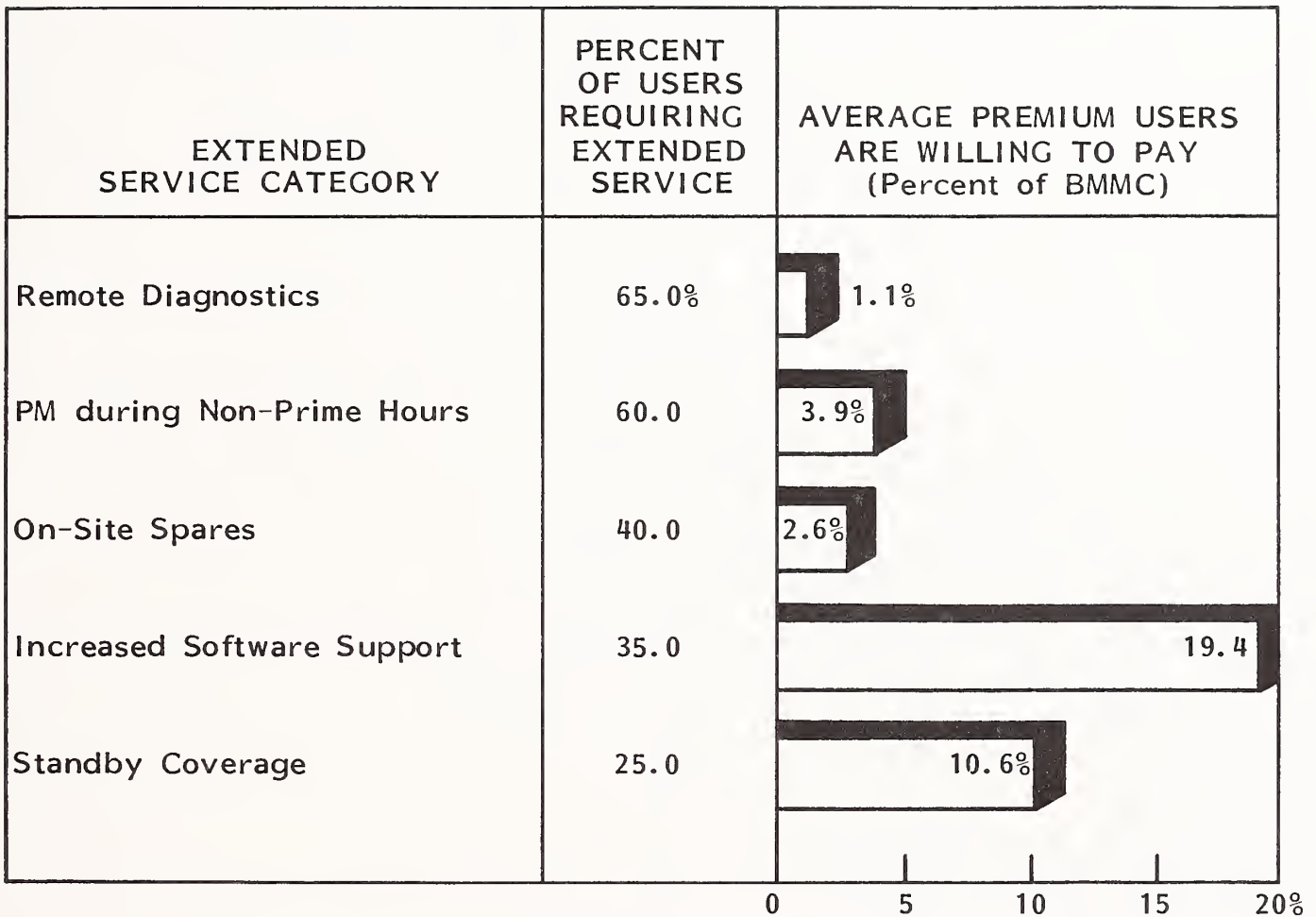
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	6.8
Satisfaction with Software Response Time	7.7
Satisfaction with Software Repair Time	7.3

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.7	0.9
Average Software Response Time (Hours)	8.8	4.6
Average Software Repair Time (Hours)	17.2	16.8

EXHIBIT IX-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: HONEYWELL



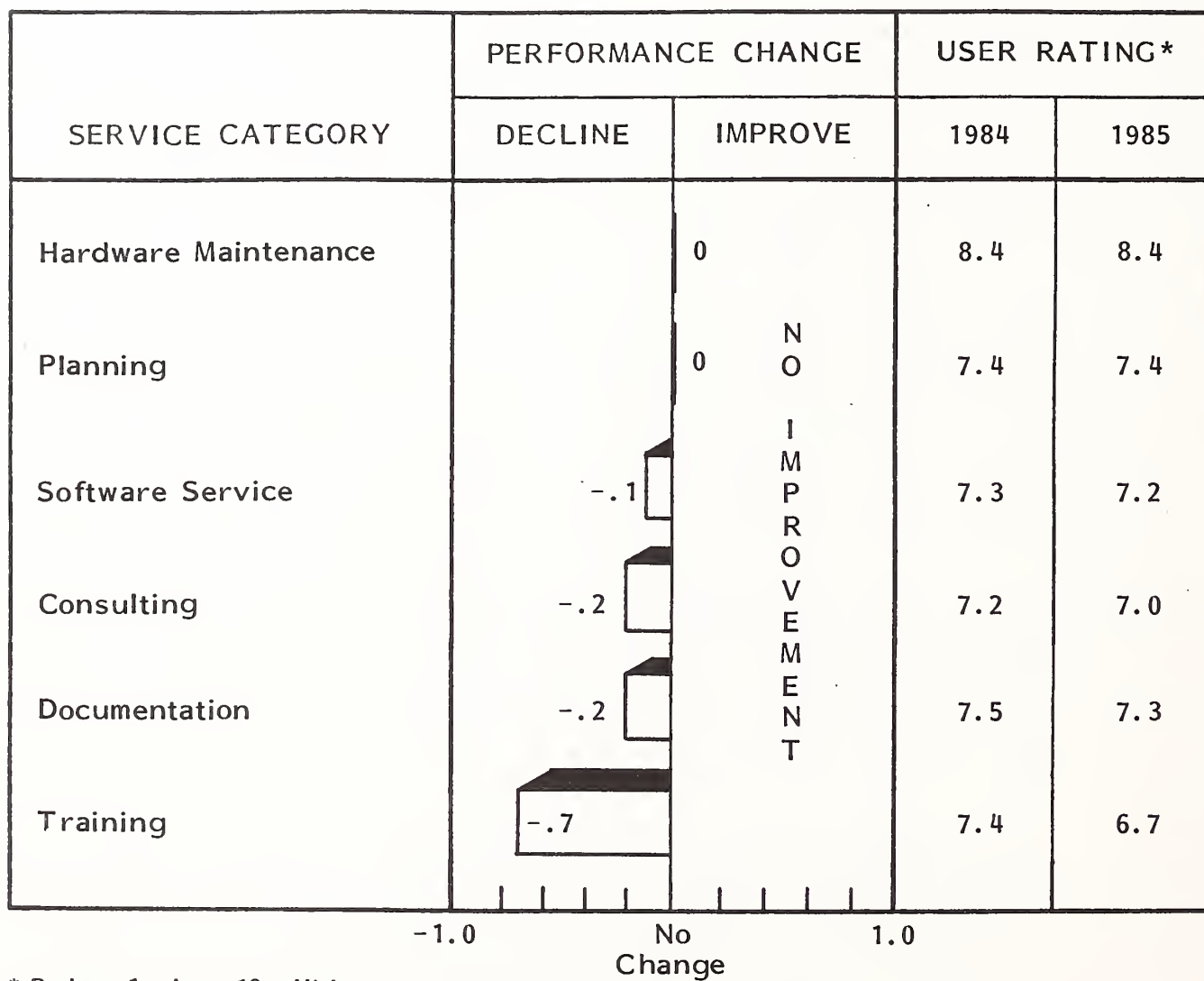
X IBM

X IBM

- A total of 64 IBM small-system users were interviewed for this report including 20 Series I users, 20 System 36 users, and 24 System 38 users. These systems have been installed an average of 2.7 years, although the respondents indicated that they had used IBM service on their current and previous equipment for an average of ten years.
- Overall, IBM users are satisfied with the hardware support they are receiving although it does not always meet their requirements. Most users, however, are not satisfied with the system software support they are getting from IBM. As will be discussed below, users are particularly dissatisfied with software documentation and the training of software engineers.
- Exhibit X-1 demonstrates that users perceive little or no change in the service delivered by IBM in 1984 and 1985. It is not expected that IBM would have made major service changes; most (64%) of the company's small-system users were satisfied with service in 1984.
- However, user expectations for service increased in 1985 and, as Exhibits X-2 and X-3 demonstrate, users reported that IBM was not meeting their requirements for service. Between 1984 and 1985, for example, user requirements for training increased 17%, planning needs rose 26%, and hardware maintenance overall increased over 8%. The requirement for overall systems software maintenance increased over 18% between 1984 and 1985.

EXHIBIT X-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: IBM



* Rating: 1 = Low, 10 = High

EXHIBIT X-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: IBM

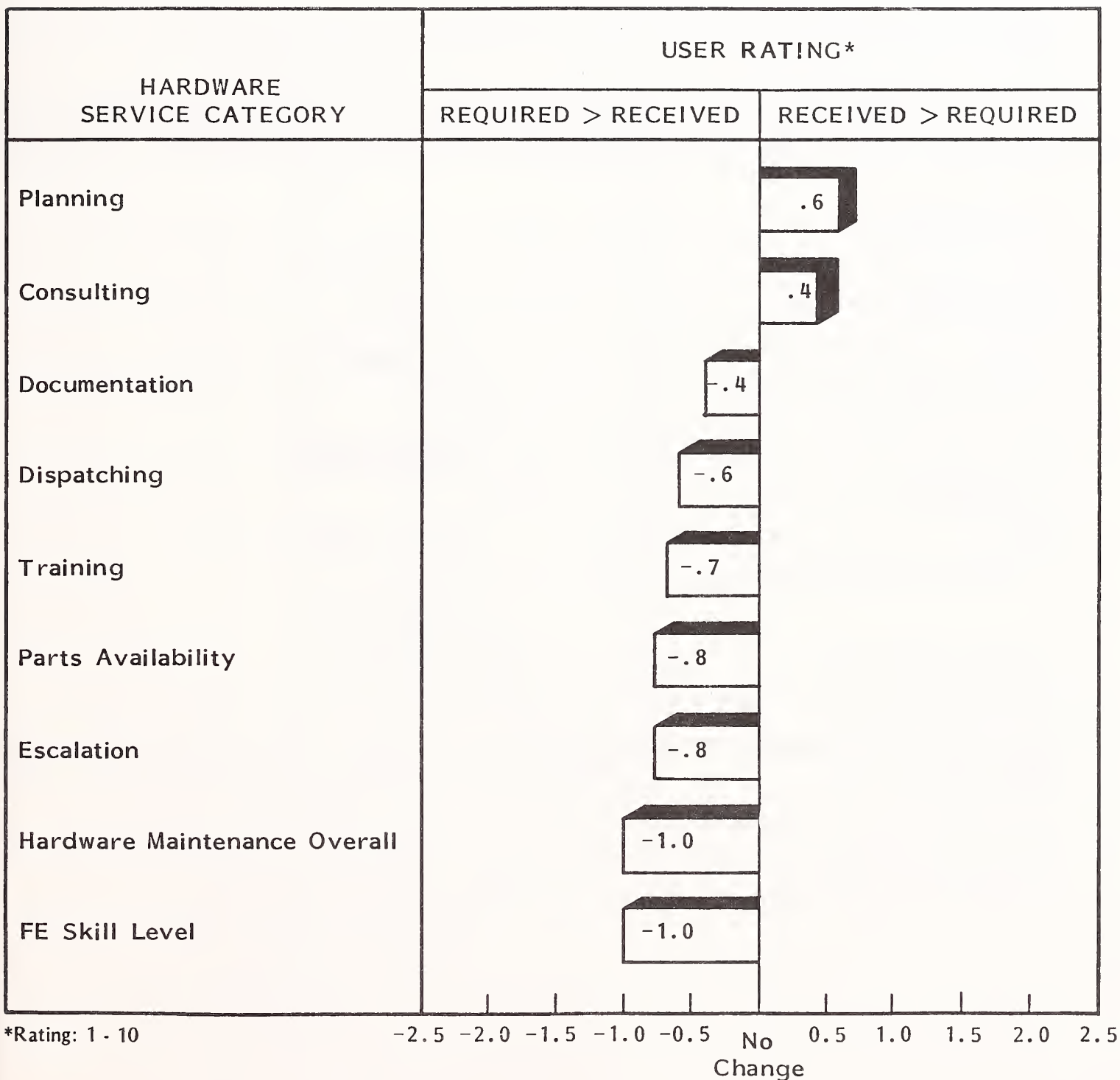
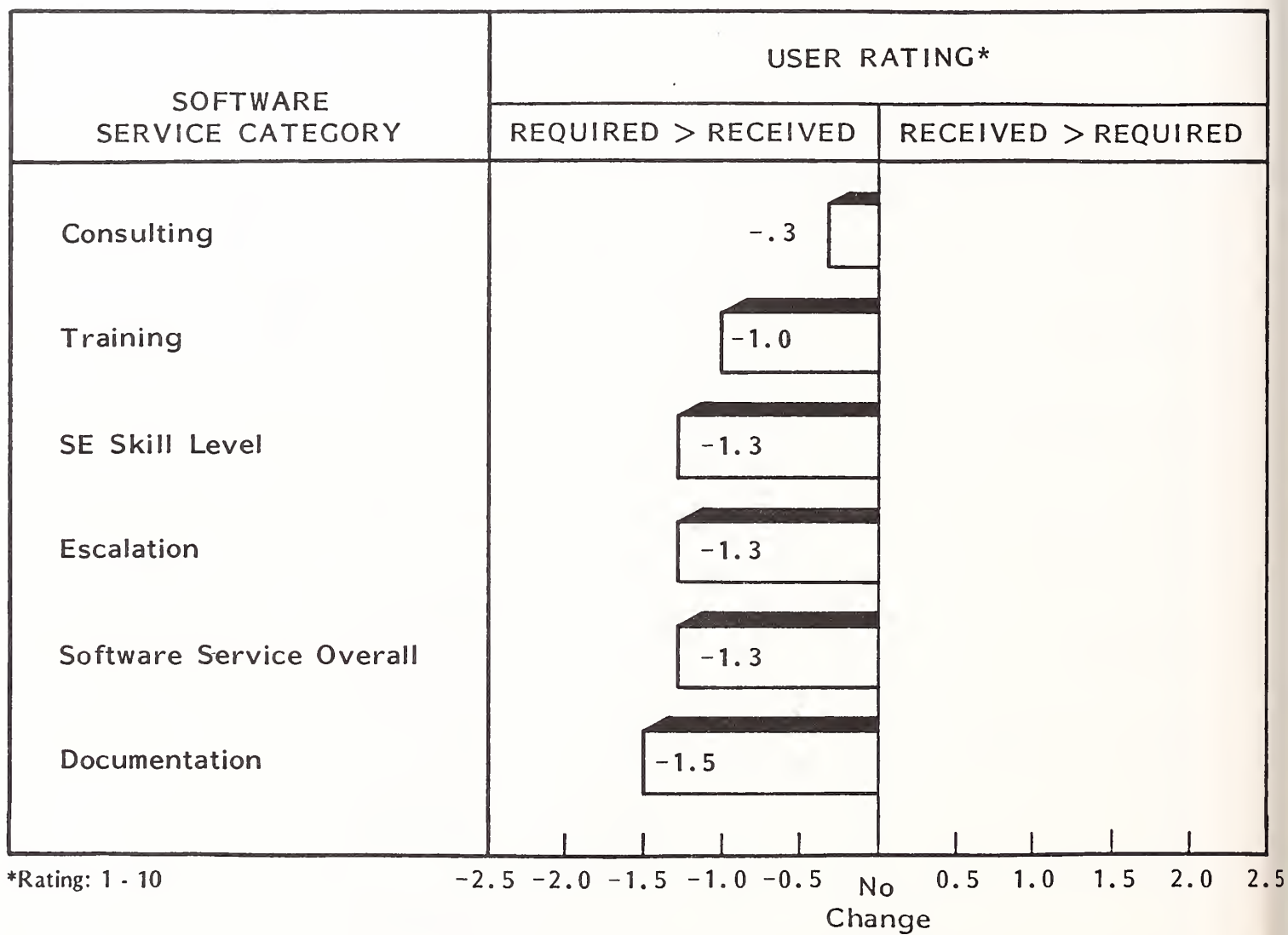


EXHIBIT X-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: IBM



- This increase in user expectations for both hardware and software service has had a negative effect on user satisfaction rates, as shown in Exhibits X-4 and X-5. In 1984, 71% of IBM small-system users were satisfied with overall hardware service, but in 1985 only 47% were satisfied. The drop in satisfaction with software maintenance is even more dramatic, from 64% satisfied in 1984 to 42% in 1985.
- Although IBM has not improved its hardware and software services, it should be noted that the company's overall level of service in both 1984 and 1985 is substantially above average. Parts availability, for example, was rated at 8.0 for IBM users versus the 7.5 average for small-system users.
- Exhibits X-6 and X-7 plot user requirements for hardware and software services versus the level of service actually received from the vendor. Most users are satisfied with the hardware services in Exhibit X-6 with the exception of FE skill level (H) and overall hardware maintenance (I). Systems software service, on the other hand, has low satisfaction rates. INPUT believes that user dissatisfaction with software service results primarily from below average response and repair times from IBM. As shown below, system software repair time, in particular, increased dramatically in 1985, which resulted in low user ratings of the software engineer skill level, escalation procedures and, perhaps most importantly, documentation.
- Improvements in IBM's actual hardware service, as shown in Exhibit X-8, were substantial in 1985. The average number of hardware interruptions fell by 66%, system availability increased by 5%, and total hardware repair time (including response and repair time) fell by 12% to just over six hours. IBM users reported the fewest number of hardware system interruptions (0.5 per month) and one of the highest system availability levels (97.2) of all small-system users. This was clearly the motivation behind the high user hardware service satisfaction rates.

EXHIBIT X-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
IBM

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Hardware Maintenance Overall	9.4	8.4	46.9%
FE Skill Level	9.3	8.3	46.9
Escalation	9.0	8.2	56.7
Parts Availability	8.8	8.0	52.4
Dispatching	8.8	8.2	57.4
Documentation	7.7	7.3	58.3
Training	7.4	6.7	53.4
Planning	6.8	7.4	69.8
Consulting	6.6	7.0	66.7




A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT X-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: IBM

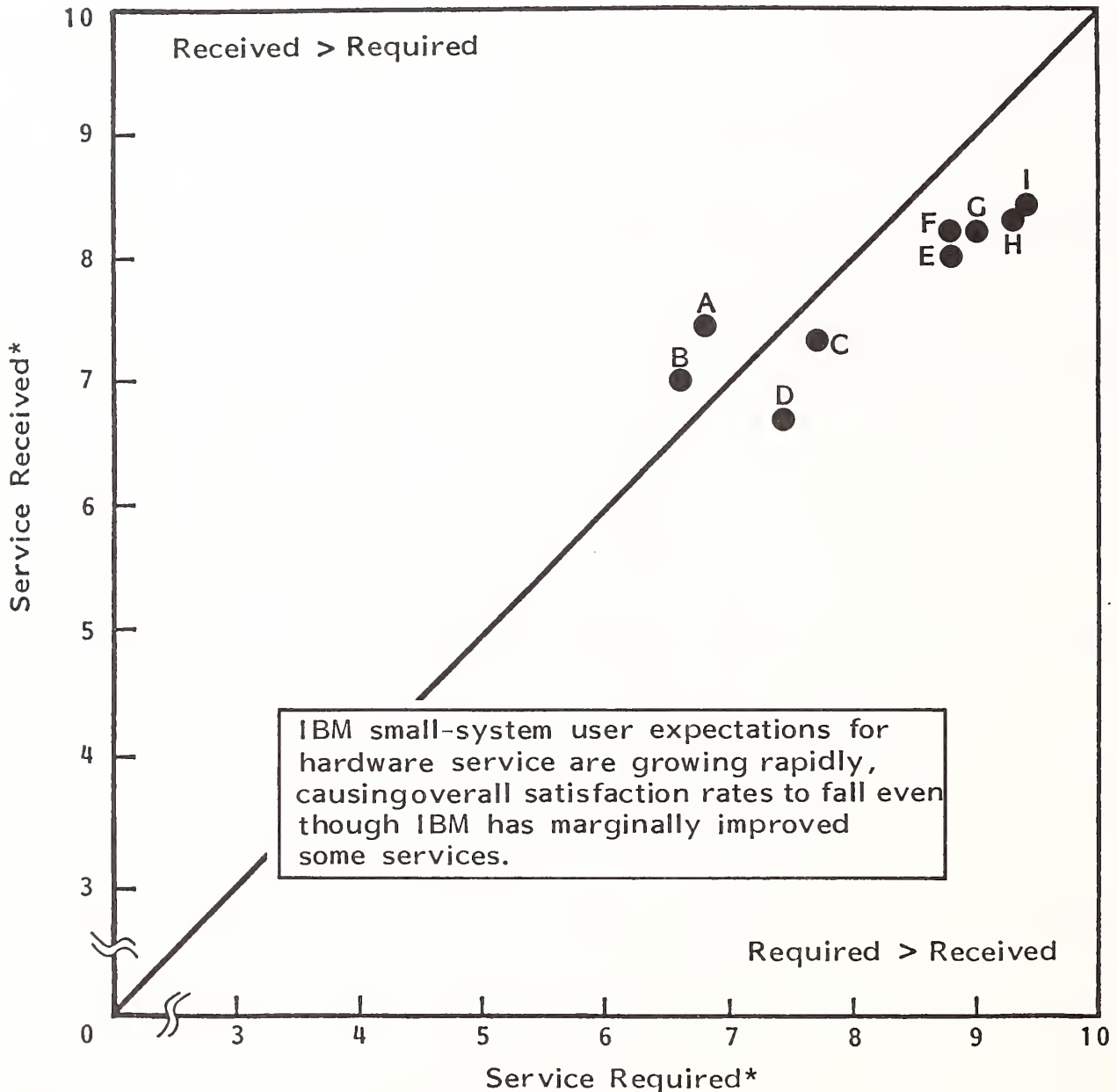
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	9.0	7.5	30.5%
Software Service Overall	8.5	7.2	41.8
SE Skill Level	8.3	7.0	35.4
Escalation	8.2	6.9	42.9
Training	7.6	6.6	40.0
Consulting	7.1	6.8	51.0

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT X-6

IBM HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

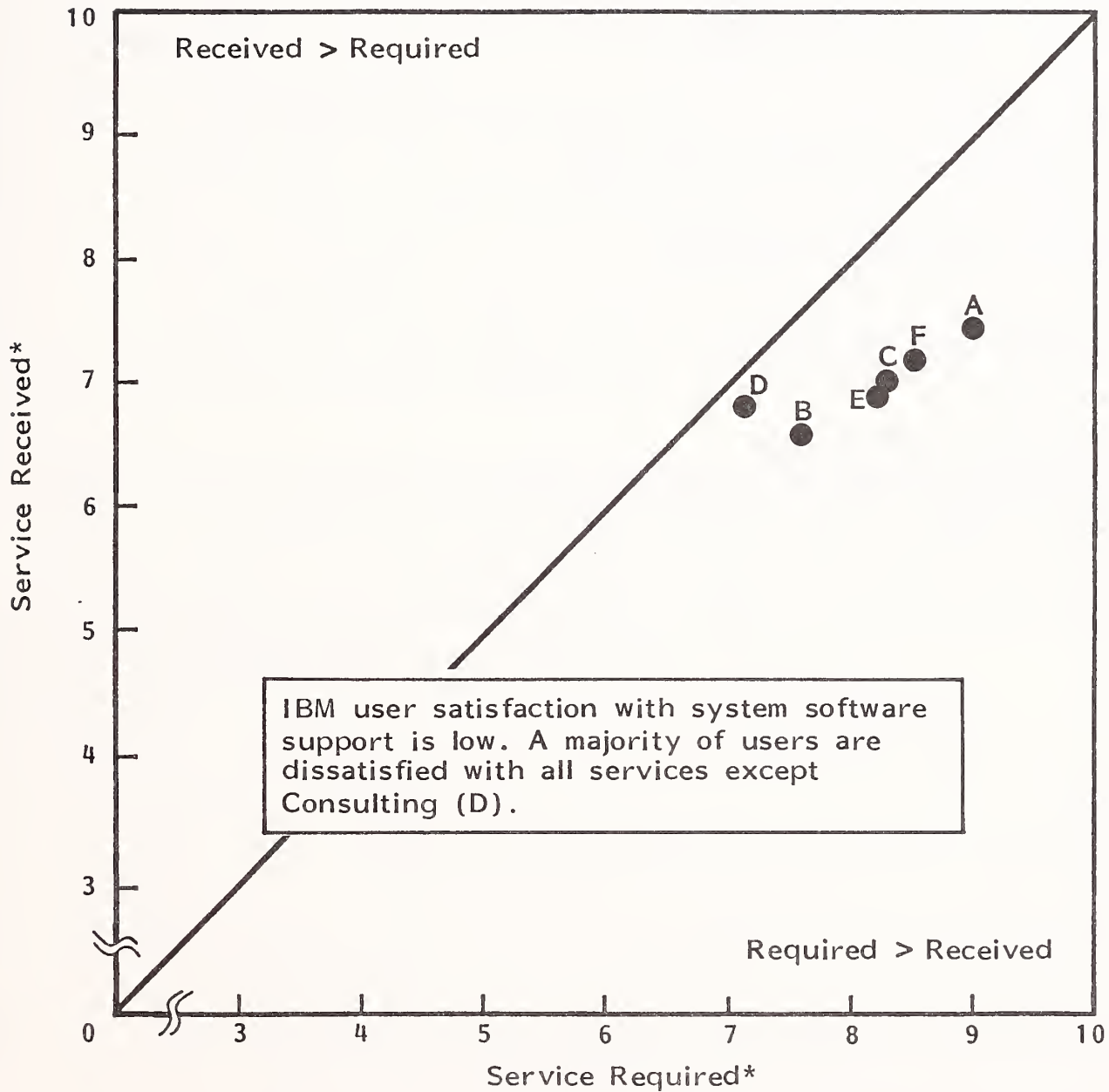


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT X-7

IBM SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT X-8

HARDWARE SERVICE COMPONENT DATA:
IBM

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.4
Satisfaction with System Availability	9.2
Satisfaction with Response Time	8.6
Satisfaction with Repair Time	8.6

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.5	0.5
Average System Availability (Percent)	92.7%	97.2%
Average Hardware Response Time (Hours)	2.6	2.2
Average Hardware Repair Time (Hours)	3.4	3.1

- IBM's actual software support performance in 1985, listed in Exhibit X-9, indicated some improvements but overall was not up to 1984 levels. While IBM small-system users reported the fewest number of system software interruptions per month (0.2), response and repair times were below average. IBM's overall average repair time (including response and repair time) increased 48% to over 25 hours over 1984 performance. The company fell substantially below average in both response and repair time categories in 1985 after being well above average in 1984.
- Possibly because they are not receiving the level of service they have come to expect, IBM small-system users have indicated a willingness to pay high premiums for extended services, as shown in Exhibit X-10. Surprisingly, only a small percentage (14.1%) of these users indicated a requirement for increased software support. However, IBM users were willing to pay substantially higher than average premiums for preventive maintenance during non-prime hours, remote diagnostics, on-site spares, and standby coverage.
- IBM users have not expressed any overwhelming desire to become involved in maintenance nor are they price-sensitive about service; however, they do expect a consistently high level of service. IBM must improve system software support procedures and the perceived level of engineer training if it intends to meet its users' high service expectations.

EXHIBIT X-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
IBM

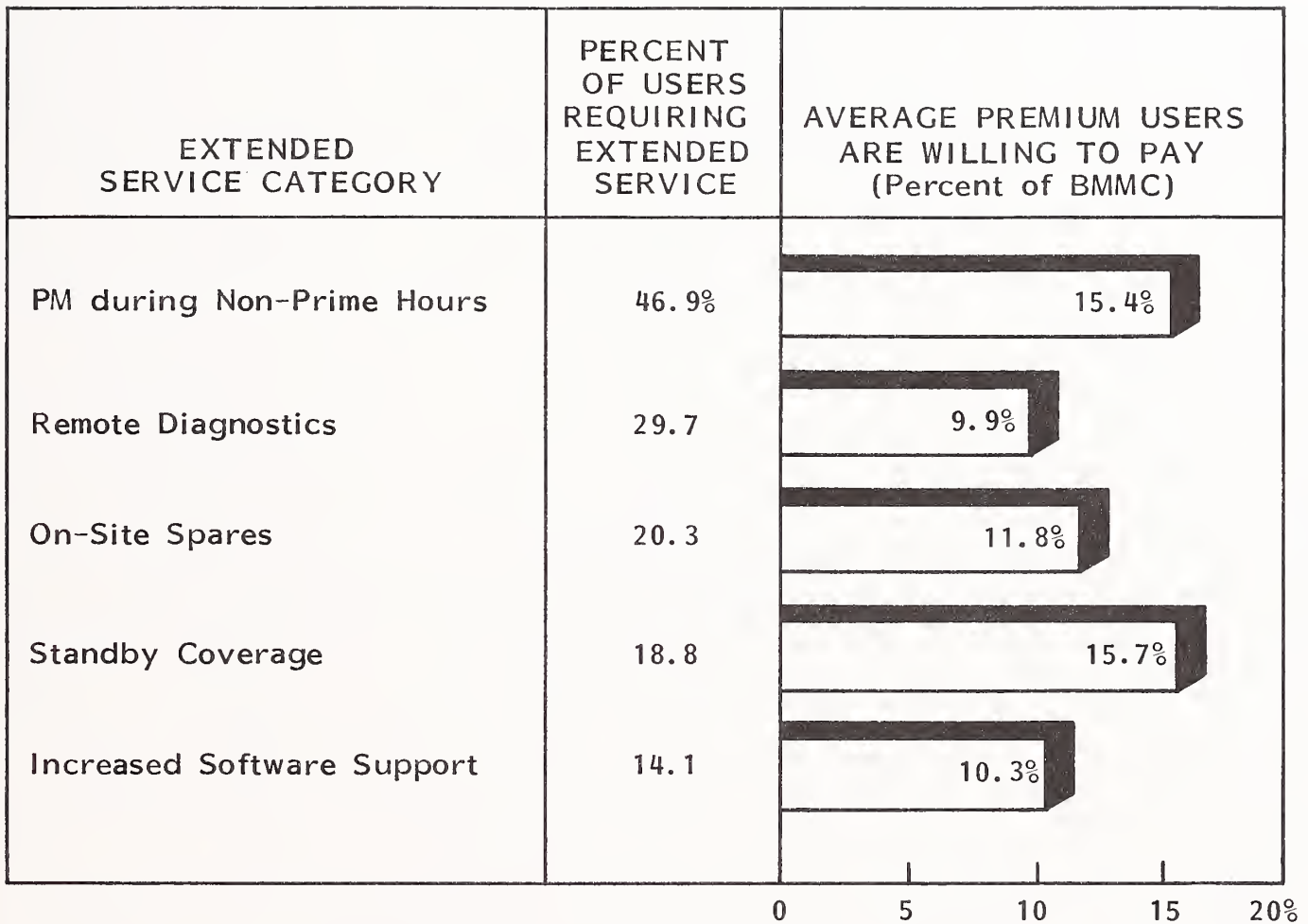
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.5
Satisfaction with Software Response Time	7.3
Satisfaction with Software Repair Time	7.5

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.5	0.2
Average Software Response Time (Hours)	8.2	8.1
Average Software Repair Time (Hours)	8.8	17.0

EXHIBIT X-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: IBM



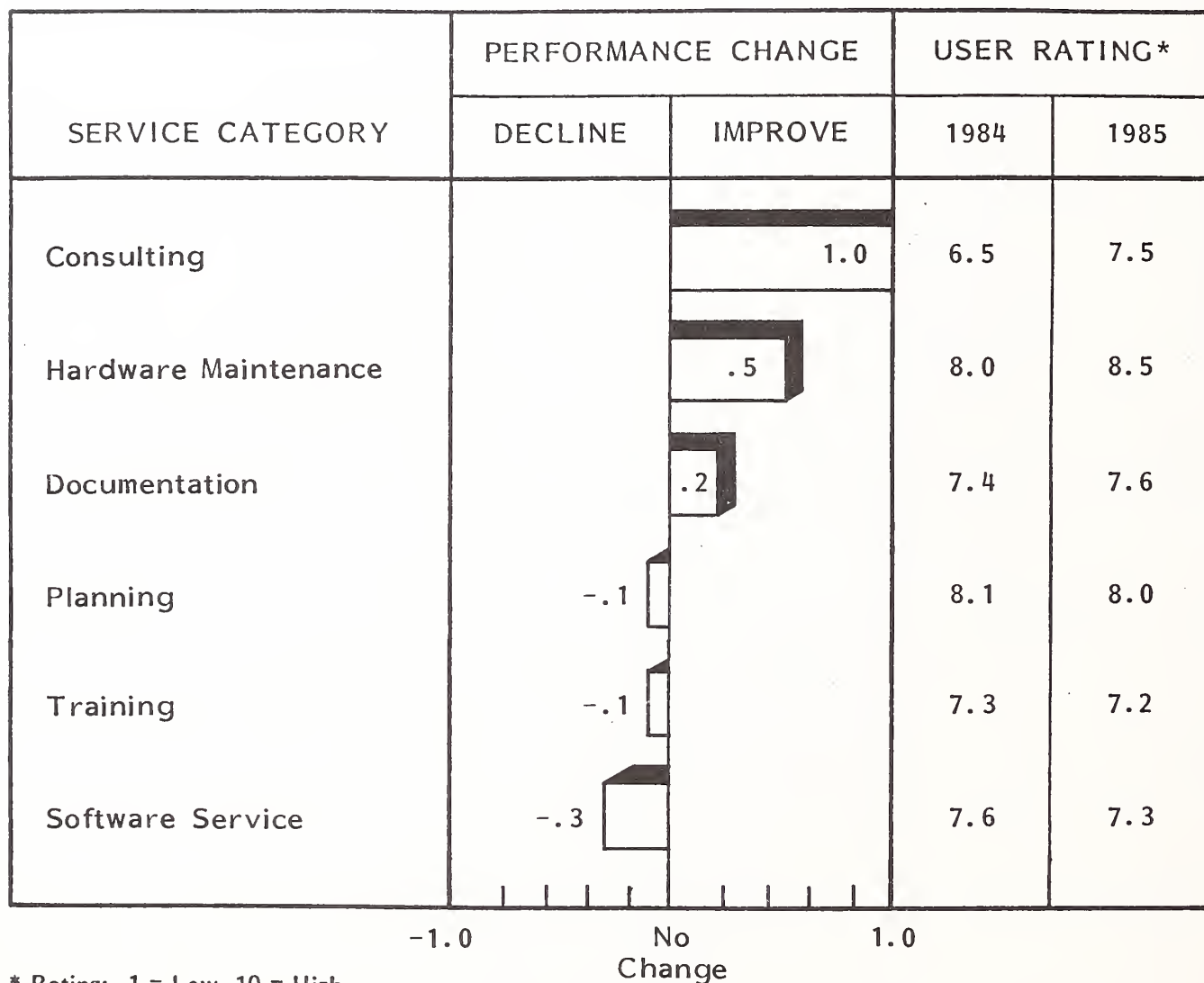
XI NCR

XI NCR

- Forty-one NCR users were interviewed in 1985 including 20 9100 users and 21 9300 users. These respondents reported that their systems had been installed for just under a year and that, on average, they had used NCR service for just under three years.
- Overall, NCR small-system users are quite satisfied with service, particularly hardware maintenance. As is discussed below, hardware support has improved substantially in such key areas as response and repair time, number of interruptions, and system availability. Users are becoming increasingly dissatisfied, however, with system software support. Few, if any, gains have been made in response or repair times, and the number of software interruptions has increased dramatically.
- User ratings of NCR performance in 1984 and 1985 are contained in Exhibit XI-1. As the exhibit demonstrates, substantial improvements were made in both consulting and hardware maintenance. There has been little or no change in documentation, training, and planning--areas in which users were very satisfied last year and in 1985 as well. Users reported a drop in software service, however, satisfaction with systems software increased--a seemingly contradictory situation which will be discussed below.
- Although most NCR small-system users are satisfied with the vendor's hardware service, Exhibit XI-2 demonstrates that NCR is still not meeting user requirements for many hardware-related services. The most substantial

EXHIBIT XI-1

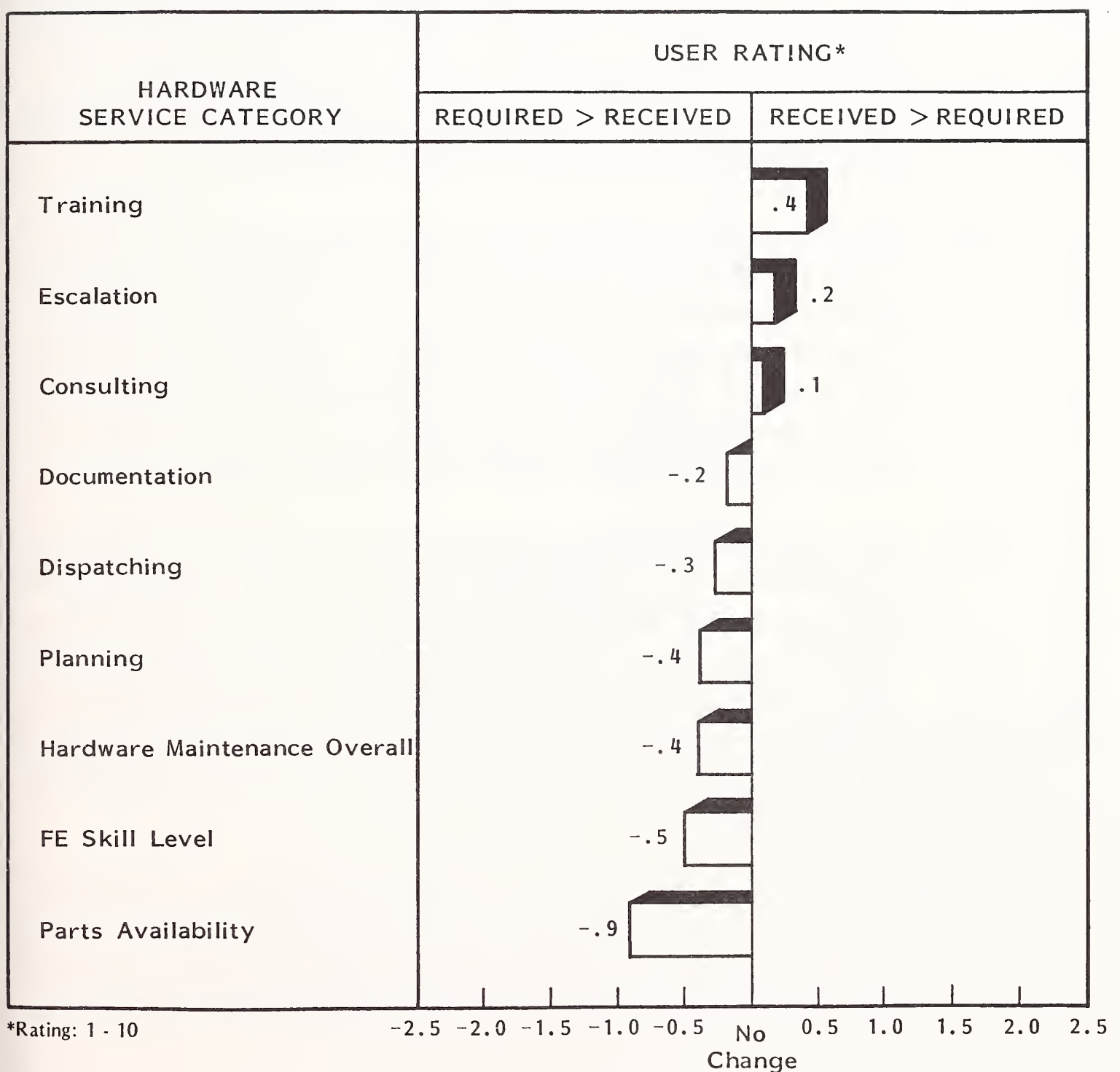
SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: NCR



* Rating: 1 = Low, 10 = High

EXHIBIT XI-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES:
NCR



variation between expectation and actual service delivered is in parts availability and FE skill level. INPUT believes that NCR users, like most other small-system users, have come to depend on their equipment more and more, and are concerned about vendor cost-saving measures, such as lower parts stocking levels.

- User ratings of software service, shown in Exhibit XI-3, indicate a substantial variance, particularly in the areas of training and documentation. INPUT feels that increased expectations for service in these two areas are an indication that, in the absence of NCR service, users are trying to provide internal support, which requires improved documentation and training.
- User satisfaction with hardware and software service is shown in Exhibits XI-4 and XI-5. Although NCR users reported that the company did not meet their hardware service expectations in six out of the nine categories in Exhibit XI-4, satisfaction was quite high in all categories. INPUT believes that while users say they are not receiving the level of support they require, in fact, they are impressed with improvements made in hardware service over the last year and are, in general, satisfied with NCR's service performance.
- User satisfaction with systems software support is substantially lower than with hardware service, as evidenced in Exhibit XI-5. While NCR continues to rank above average in systems software support, service is deteriorating according to NCR users. INPUT believes that the major problem areas are with the user's perception of low software engineer capabilities. Despite the satisfaction that a majority of NCR users report with the SE skill level, the gap between user requirements and received level of service is substantial and must be corrected.
- Exhibits XI-6 and XI-7 plot user requirements for hardware and software service against actual vendor performance as reported by the users. These exhibits demonstrate the relative density of user requirements and vendor performance as opposed to 1984. User requirements in 1984 ranged from 3.3

EXHIBIT XI-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: NCR

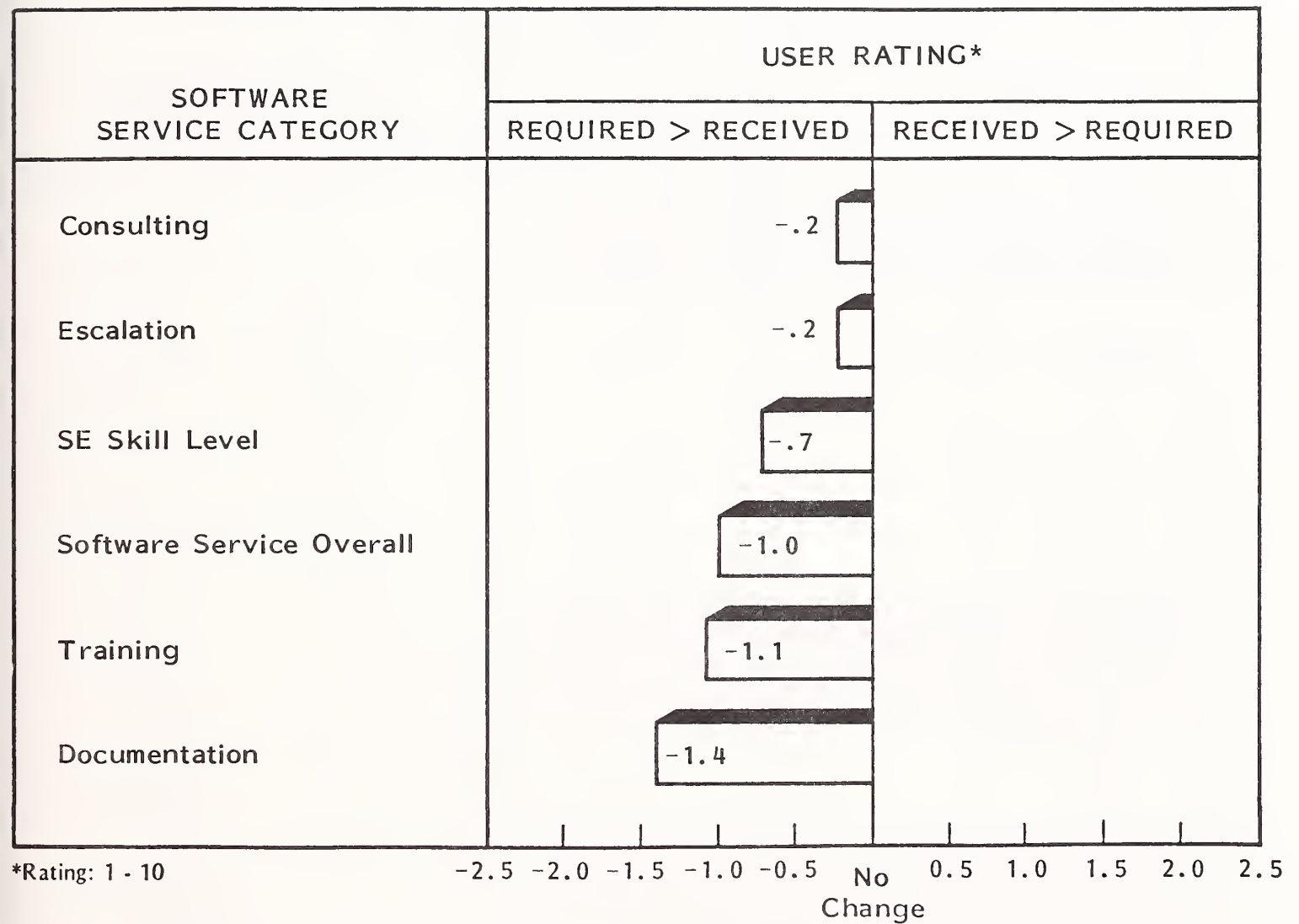


EXHIBIT XI-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
NCR


HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
FE Skill Level	9.0	8.5	55.0%
Hardware Maintenance Overall	8.9	8.5	55.3
Parts Availibility	8.6	7.7	55.0
Dispatching	8.6	8.3	55.0
Planning	8.4	8.0	59.5
Documentation	7.8	7.6	57.5
Escalation	7.7	7.9	71.9
Consulting	7.4	7.5	59.4
Training	6.8	7.2	55.6

*Rating: 1 = Low, 10 = High

EXHIBIT XI-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: NCR

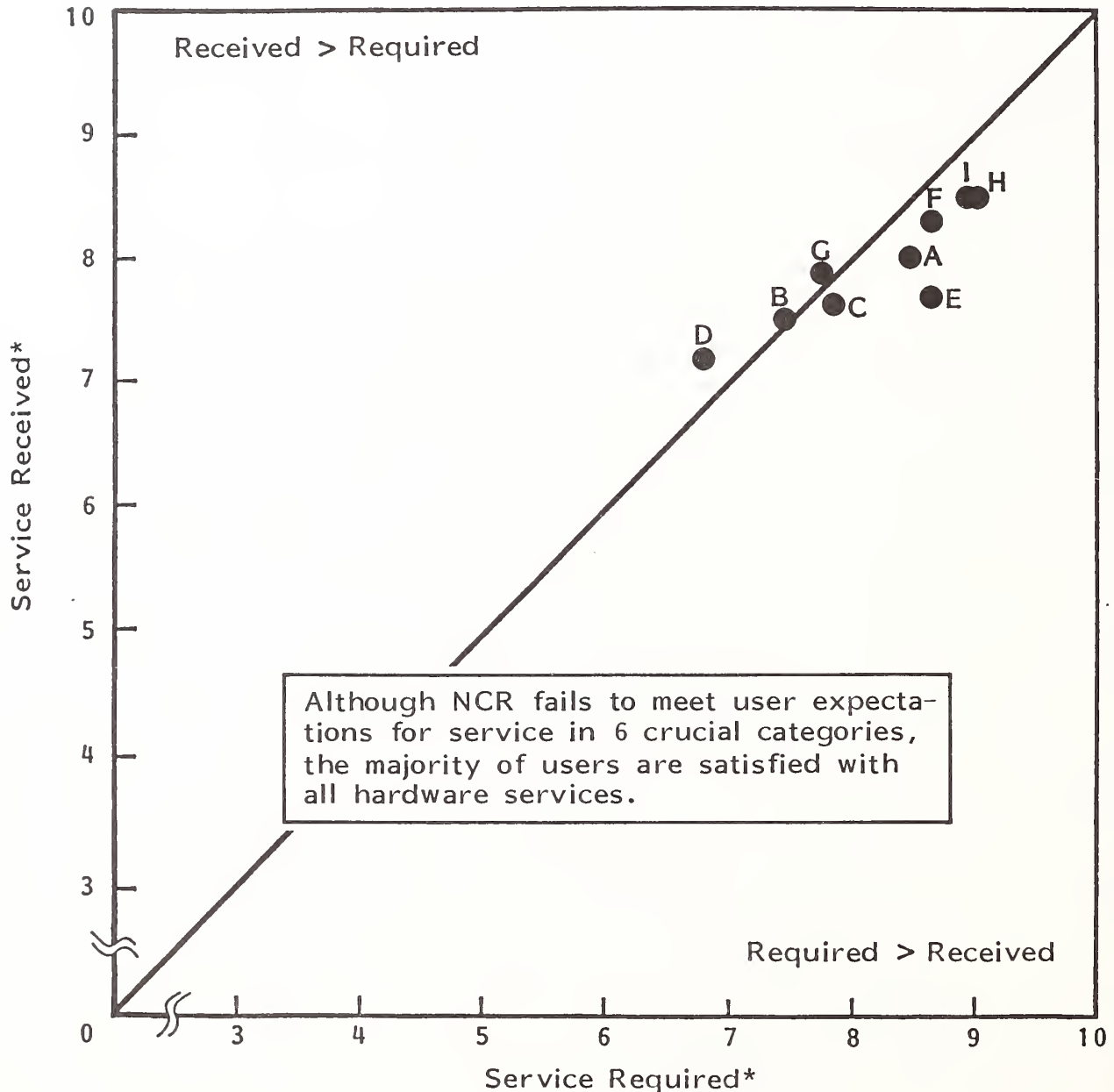
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	8.6	7.2	40.0%
Software Service Overall	8.3	7.3	55.6
SE Skill Level	8.1	7.4	51.4
Training	7.7	6.6	38.9
Consulting	7.3	7.1	51.9
Escalation	7.1	6.9	48.1

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT XI-6

NCR HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

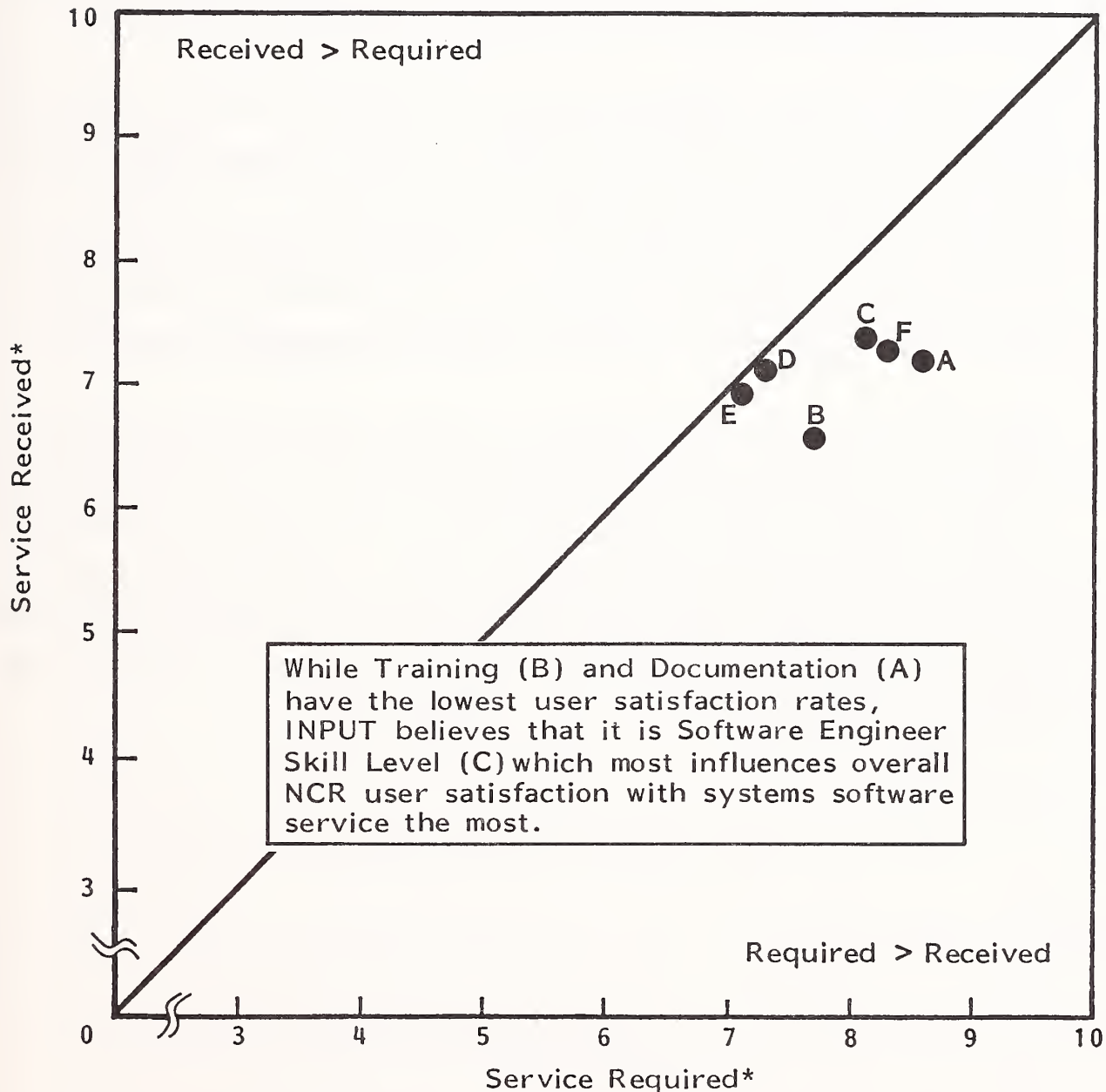


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT XI-7

NCR SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

up to 8.7, while in 1985 ranged from 7.1 to 9.0. This indicates that user attitudes about the value of service are increasing.

- Actual hardware and systems software service performance are listed in Exhibits XI-8 and XI-9. As mentioned earlier, system availability has improved substantially as a result of improved hardware response/repair times and a lower number of hardware interruptions. Overall, hardware interruptions have declined by 47% and response/repair time has improved by 45%.
- The average number of system software interruptions per month, as shown in Exhibit XI-9, has increased to substantially above average in 1985, which explains the relatively low user ratings of software service. In addition, NCR registered essentially no improvement in software response/repair time in 1985 over 1984. Despite no improvement, NCR's software response/repair time in 1985 is still 25% better than the average for small-system vendors.
- Although NCR users require improved services, Exhibit XI-10 indicates that they are not willing to pay any additional premiums to receive improved services. A higher than average percent of NCR users appear to be somewhat service price-sensitive. However, because NCR users are much less willing than average to perform their own in-house maintenance, INPUT believes that high user requirements for service give a good indication of potential service revenue opportunities.

EXHIBIT XI-8

HARDWARE SERVICE COMPONENT DATA:
NCR

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.8
Satisfaction with System Availability	9.0
Satisfaction with Response Time	8.5
Satisfaction with Repair Time	8.6

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.7	0.9
Average System Availability (Percent)	91.8%	95.6%
Average Hardware Response Time (Hours)	6.4	9.1
Average Hardware Repair Time (Hours)	4.8	2.1

EXHIBIT XI-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
NCR

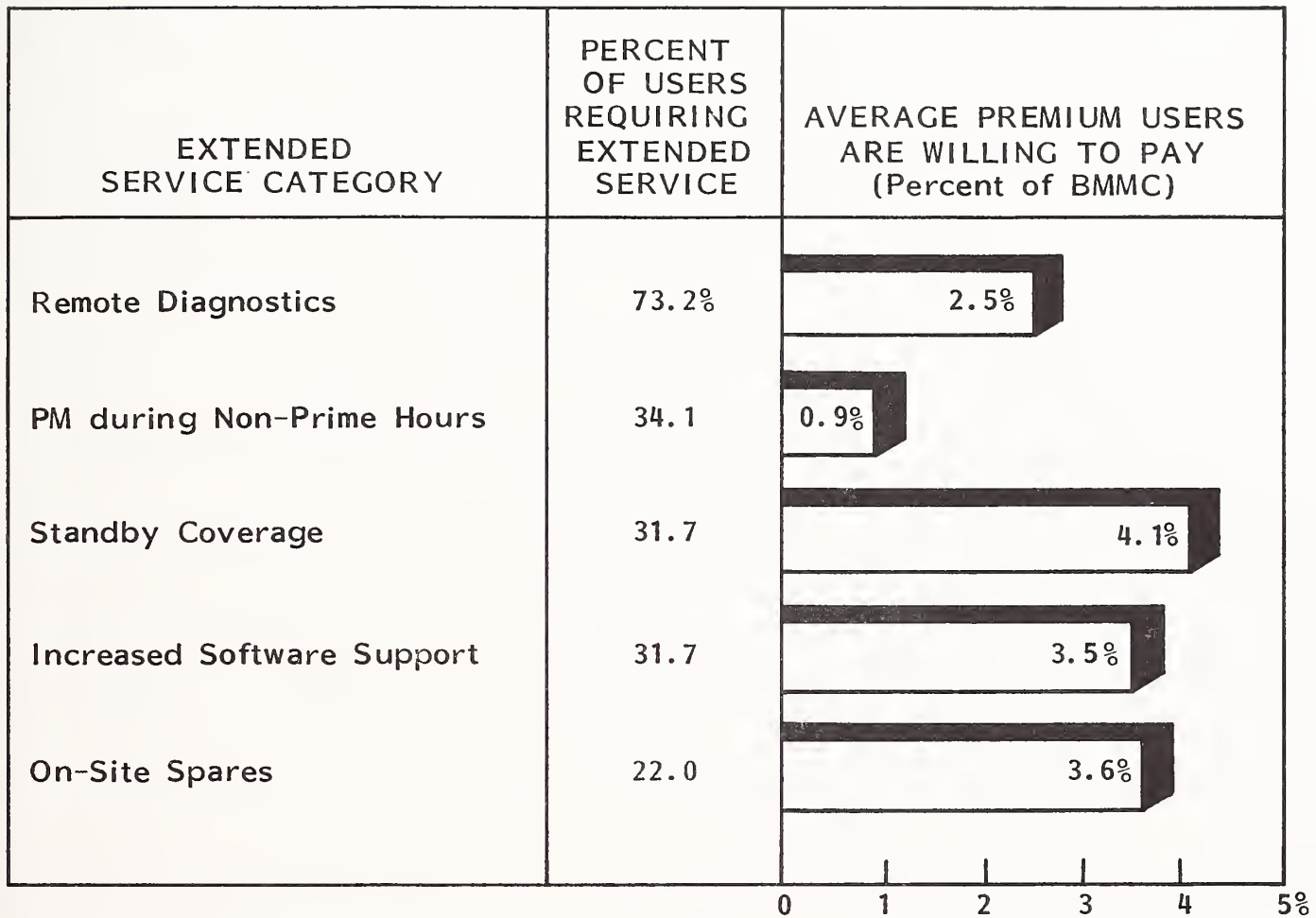
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.6
Satisfaction with Software Response Time	7.5
Satisfaction with Software Repair Time	7.2

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.2	1.0
Average Software Response Time (Hours)	7.8	7.9
Average Software Repair Time (Hours)	10.0	9.5

EXHIBIT XI-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: NCR



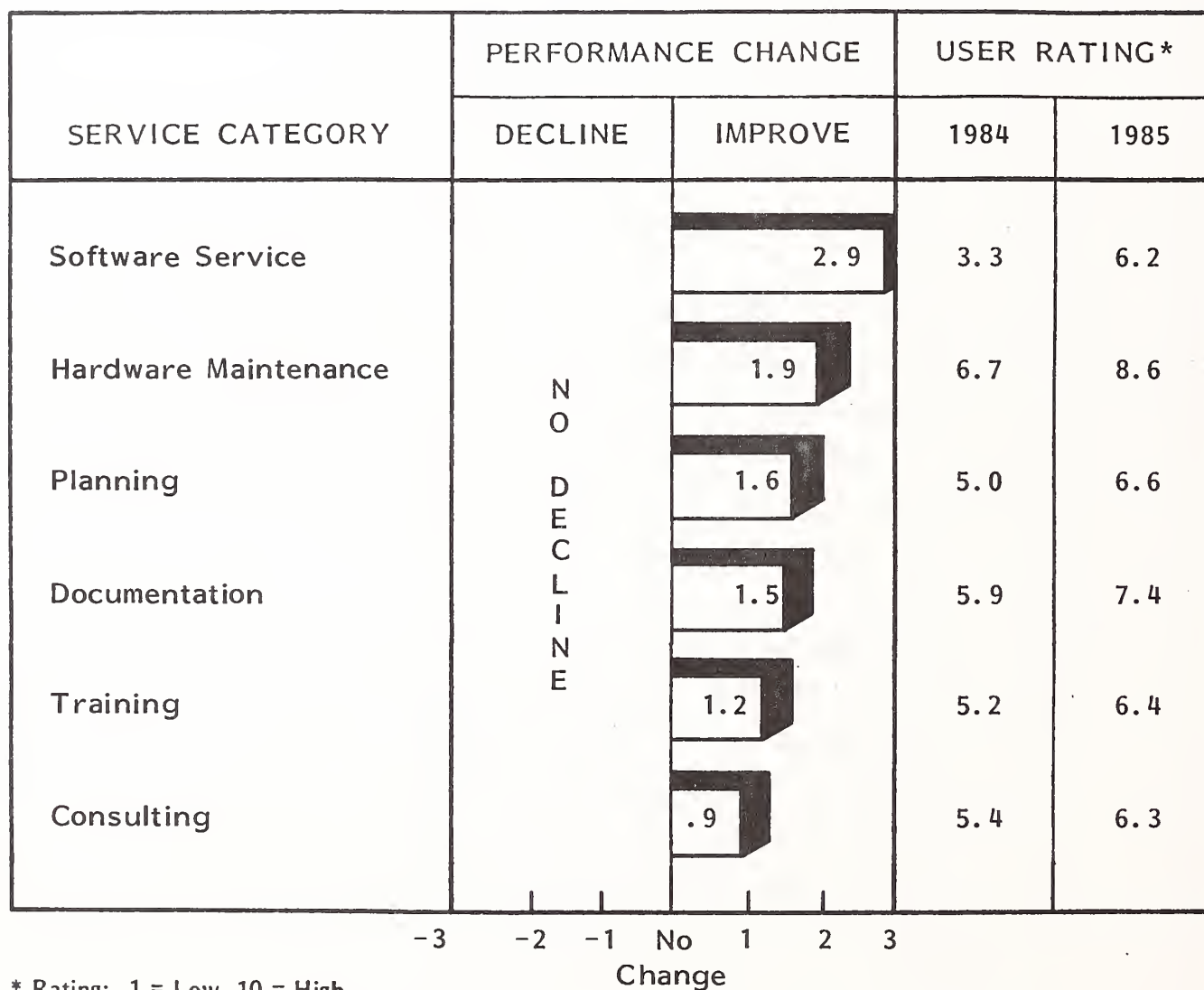
XII PERKIN-ELMER

XII PERKIN-ELMER

- The 18 Perkin-Elmer 32XX users interviewed for this report were generally satisfied with hardware service but seriously dissatisfied with the systems software service they received. Overall, the Perkin-Elmer respondents have had their CPU for just under four years.
- In 1984 Perkin-Elmer users reported relatively low levels of service received, but they were quite satisfied, in most cases, because their requirements for services were practically nonexistent. Requirements for planning, consulting, and software support, for example, were all below 4.0 on a scale of 1 = low, 10 = high. In 1985, however, user requirements have increased dramatically and, in some cases, Perkin-Elmer has not been able to keep pace with user expectations.
- User ratings of service performance are shown in Exhibit XII-1 and demonstrate that users appreciate the improvements made in service between 1984 and 1985. Perhaps the most dramatic improvement, although not the largest, is in the area of hardware maintenance. This improvement has resulted in a majority of satisfied customers in 1985 as opposed to only 11% in 1984. Software service, on the other hand, improved substantially in 1985, but still did not keep up with user expectations for service and consequently satisfaction rates fell.
- As with most other small-system vendors, Perkin-Elmer users require the most substantial hardware service improvements in the area of parts avail-

EXHIBIT XII-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: PERKIN-ELMER



* Rating: 1 = Low, 10 = High

ability, as shown in Exhibit XII-2. The user's perception of inaccessible spare parts also has an effect on the user's satisfaction with FE's skill level and, ultimately, with hardware maintenance overall. Perkin-Elmer has improved hardware performance, particularly in the areas of system availability and response/repair time, and this is keeping current satisfaction rates high.

- Exhibit XII-3 demonstrates that user ratings of Perkin-Elmer's systems software support performance are far below expectations. Key problem areas (discussed below), are documentation and software engineer skill level. A very rapid escalation of user requirements for software support is the major reason for the shortfall in user ratings listed in Exhibit XII-3. For example, the user requirement for overall software service increased from 3.9 in 1984 to 8.2 in 1985.
- User satisfaction with Perkin-Elmer hardware and software services are listed in Exhibits XII-4 and XII-5. In hardware support, the company has maintained high levels of satisfaction with low priority services such as training, documentation, and planning. At the same time, Perkin-Elmer has increased user satisfaction with overall hardware support dramatically. The only serious problem area is with a perceived low skill level of Perkin-Elmer's field engineers.
- While hardware service satisfaction rates were increasing, systems software satisfaction was falling, as shown in Exhibit XII-5. In almost every category, user dissatisfaction rates are unacceptably high. This is because, in large part, user expectations for software service grew very quickly in 1984-1985. However, Perkin-Elmer user expectations are still significantly below average, so there will be no relief from this side. The company must increase its service offerings, specifically in the areas of documentation, training, and software engineer skill level.
- Exhibits XII-6 and XII-7 graphically demonstrate that Perkin-Elmer exceeds user expectations for service in only two of fifteen service categories.

EXHIBIT XII-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: PERKIN-ELMER

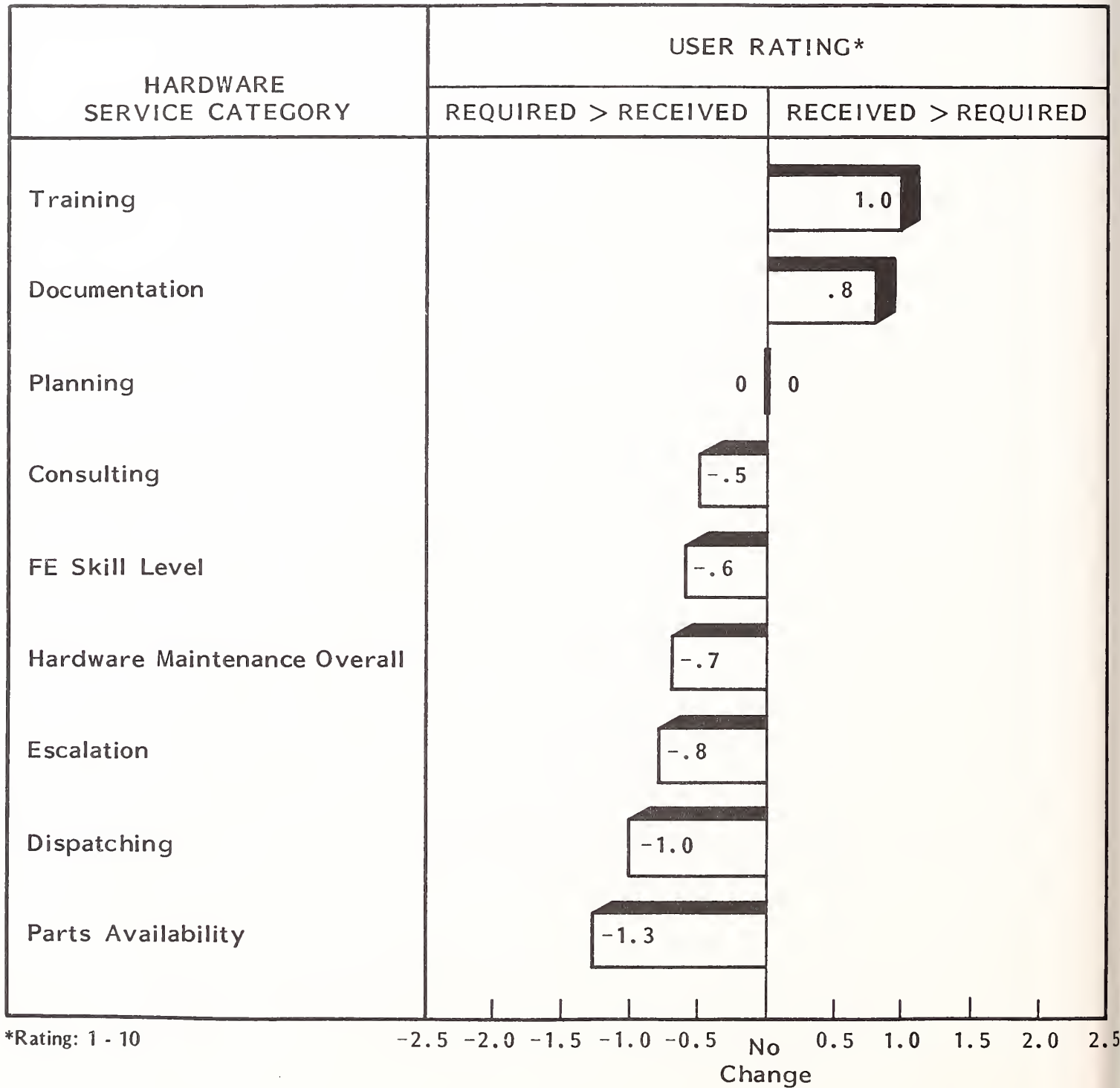


EXHIBIT XII-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: PERKIN-ELMER

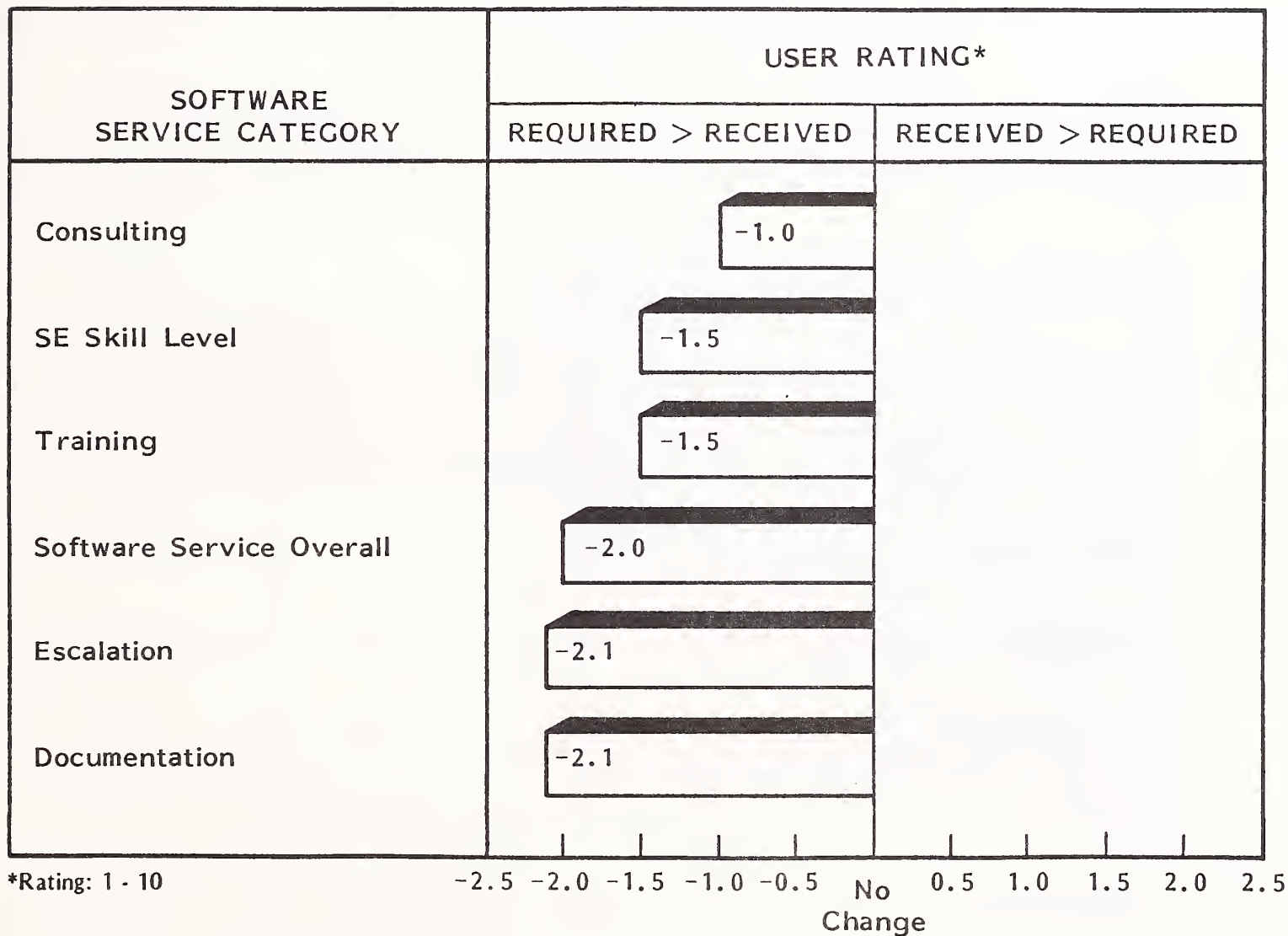


EXHIBIT XII-4

1985 USER SATISFACTION WITH HARDWARE SERVICE:
PERKIN-ELMER

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Hardware Maintenance Overall	9.3	8.6	50.0%
FE Skill Level	9.2	8.6	37.5
Parts Availability	8.8	7.5	47.1
Dispatching	8.5	7.5	64.7
Escalation	8.3	7.5	53.5
Consulting	6.8	6.3	57.1
Planning	6.6	6.6	71.4
Documentation	6.6	7.4	73.3
Training	5.4	6.4	84.6




A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT XII-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: PERKIN-ELMER

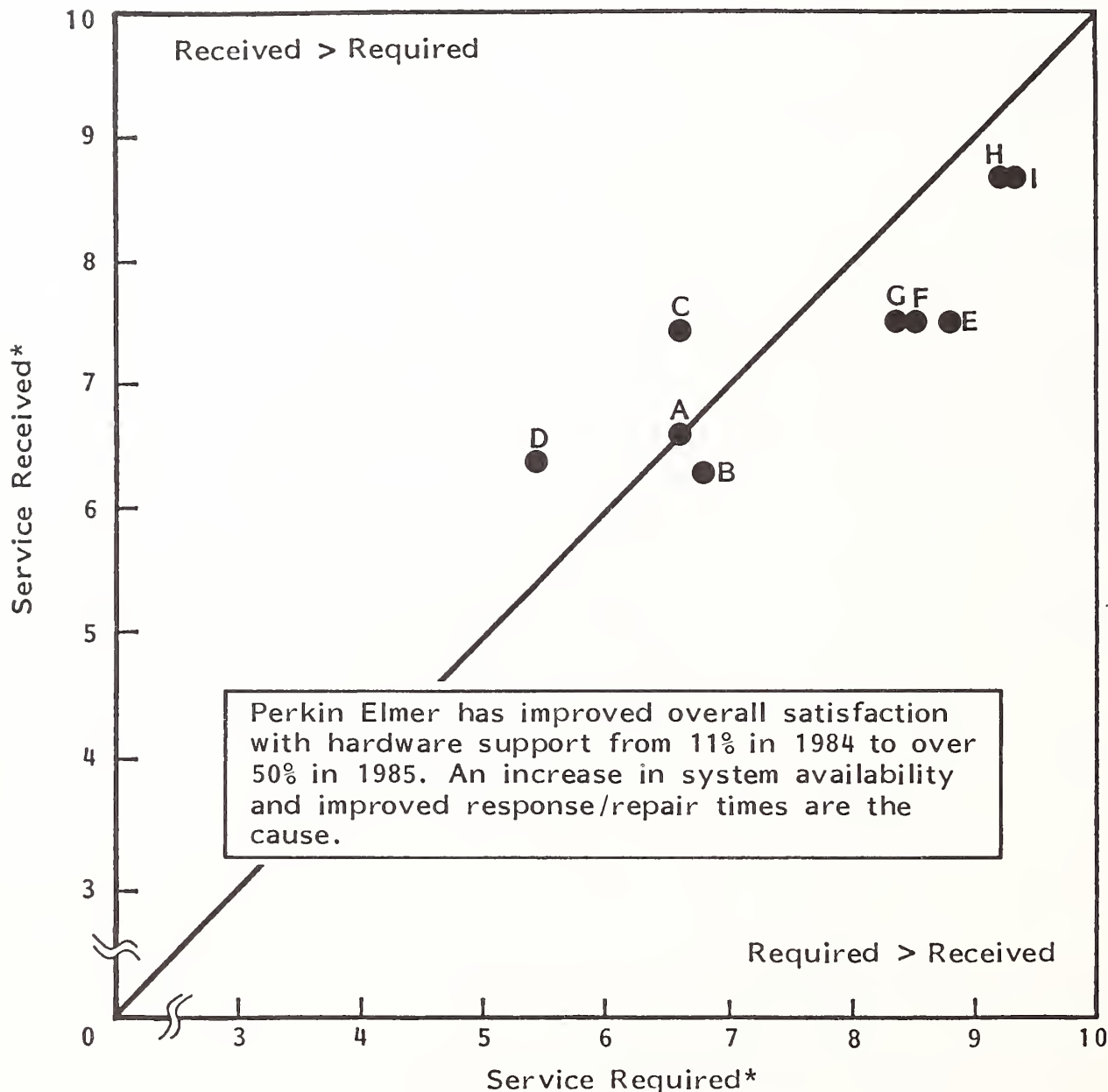
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	8.4	6.3	14.3%
Software Service Overall	8.2	6.2	30.8
Escalation	7.2	5.1	33.3
SE Skill Level	7.1	5.6	30.8
Training	6.3	4.8	20.0
Consulting	5.9	4.9	53.8

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT XII-6

PERKIN-ELMER HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

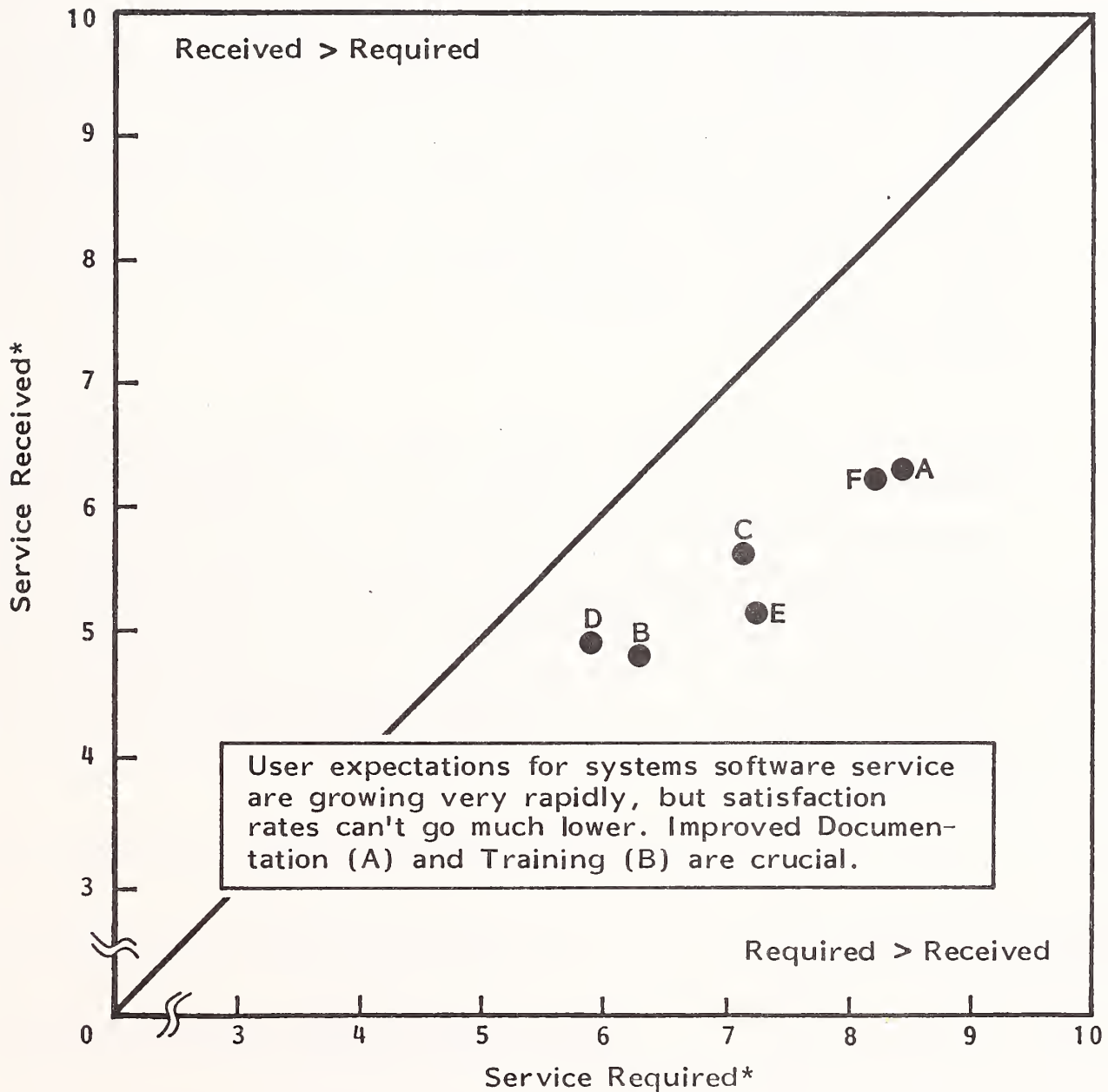


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT XII-7

PERKIN-ELMER SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

- Perkin-Elmer's actual hardware service performance, as reported by users in Exhibit XII-8, is good. Despite hardware interruptions increasing by over 200% in 1985, actual system availability increased by 7% as a result of major improvements made in hardware response and repair times (55% better than last year).
- User ratings of actual software support are substantially lower than average, as are user reports of vendor systems software performance, as shown in Exhibit XII-9. Average system software interruption increased over 300% in 1985, and software response/repair time is 56% slower than the average for all small-system vendors. Clearly, the very limited systems software support which was required two to three years ago was adequately satisfied by Perkin-Elmer, but the current increased support requirement has exposed a serious problem area.
- Perkin-Elmer may be able to use this current dissatisfaction with systems software support in order to increase revenues. Exhibit XII-10 indicates a much higher than average percent of Perkin-Elmer users (38.9%) are willing to pay an average 9% premium to receive increased software support. Since these users are typically very conservative about service premiums, INPUT believes that the actual premiums users would be willing to pay for added software service may be as high 15-20%, representing an excellent service opportunity.

EXHIBIT XII-8

HARDWARE SERVICE COMPONENT DATA:
PERKIN-ELMER

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.3
Satisfaction with System Availability	8.8
Satisfaction with Response Time	8.5
Satisfaction with Repair Time	8.4

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	1.0	3.3
Average System Availability (Percent)	90.2%	96.3%
Average Hardware Response Time (Hours)	7.8	5.6
Average Hardware Repair Time (Hours)	10.6	2.6

EXHIBIT XII-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
PERKIN-ELMER

SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	6.4
Satisfaction with Software Response Time	6.6
Satisfaction with Software Repair Time	6.2

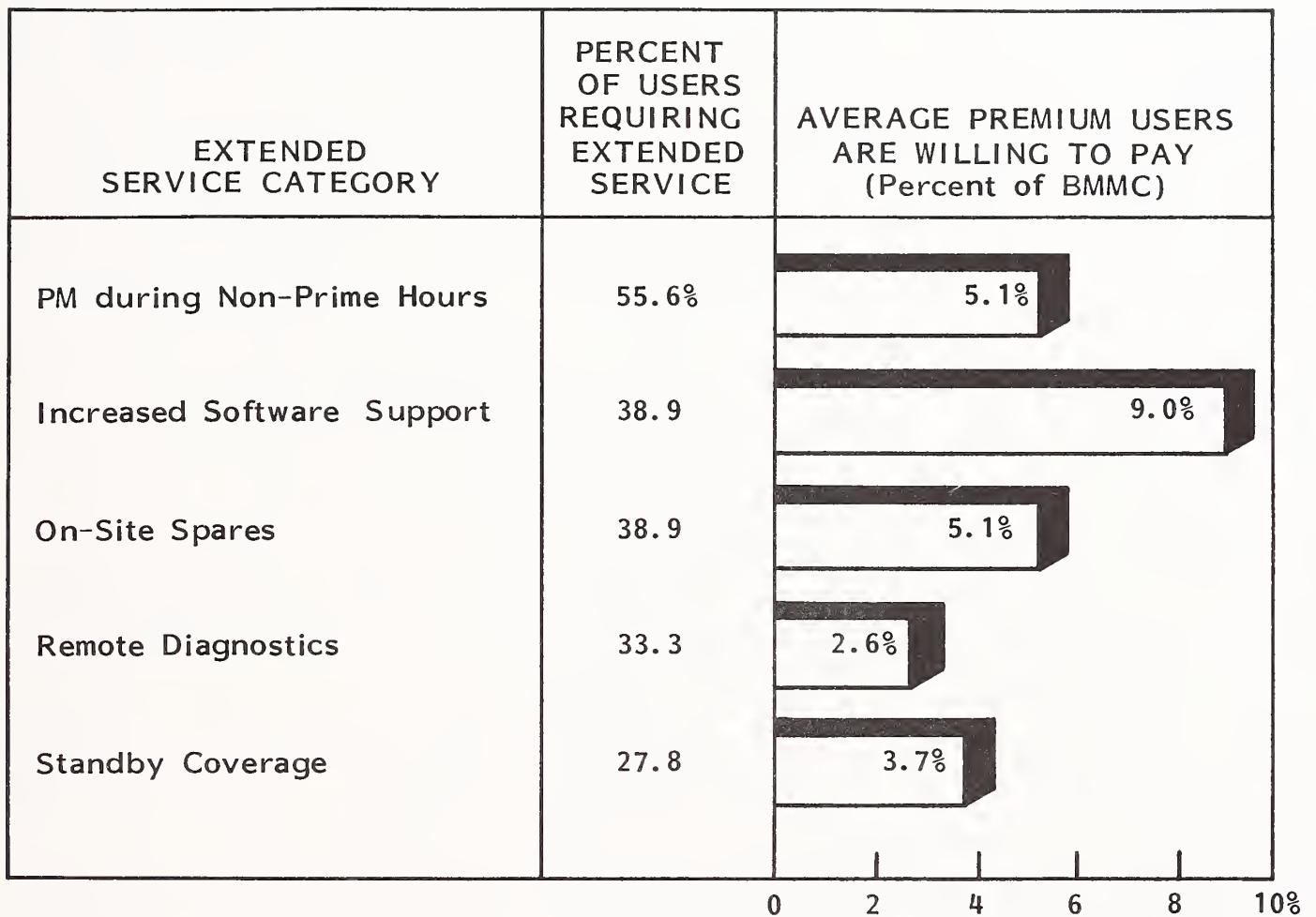
*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.3	1.4
Average Software Response Time (Hours)	†	5.6
Average Software Repair Time (Hours)	†	30.5

†Insufficient data in 1984.

EXHIBIT XII-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: PERKIN-ELMER



XIII PRIME

XIII PRIME

- The 20 Prime users that were interviewed for this report have had their "50 series" superminicomputers installed for an average of 2.6 years, somewhat less than the average of all small-system vendors included in this report--2.9 years. Most of the respondents have had Prime equipment previous to their current CPU. The average length of the relationship between Prime and the respondent was reported to be four years.
- Overall, Prime has the highest level of system availability of all small-system vendors and, as Exhibit XIII-1 demonstrates, users report that service has improved, sometimes dramatically, in a variety of key service areas. However, Prime is like most of the other superminicomputer vendors in that user expectations for service are increasing so quickly that the vendor cannot keep pace and users are consequently dissatisfied.
- On the hardware side, user requirements for spare parts, better skilled engineers, and improved dispatching and escalation procedures are most pressing, as shown in Exhibit XIII-2. User requirements for systems software support are not being met in any of the key areas listed in Exhibit XIII-3, but major problem areas include documentation, escalation, and the software engineer skill level.
- When user requirements are not realized, satisfaction with service typically suffers. As Exhibits XIII-4 and XIII-5 demonstrate, Prime user satisfaction with key services is low and, in some cases, falling in comparison to 1984. For

EXHIBIT XIII-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: PRIME

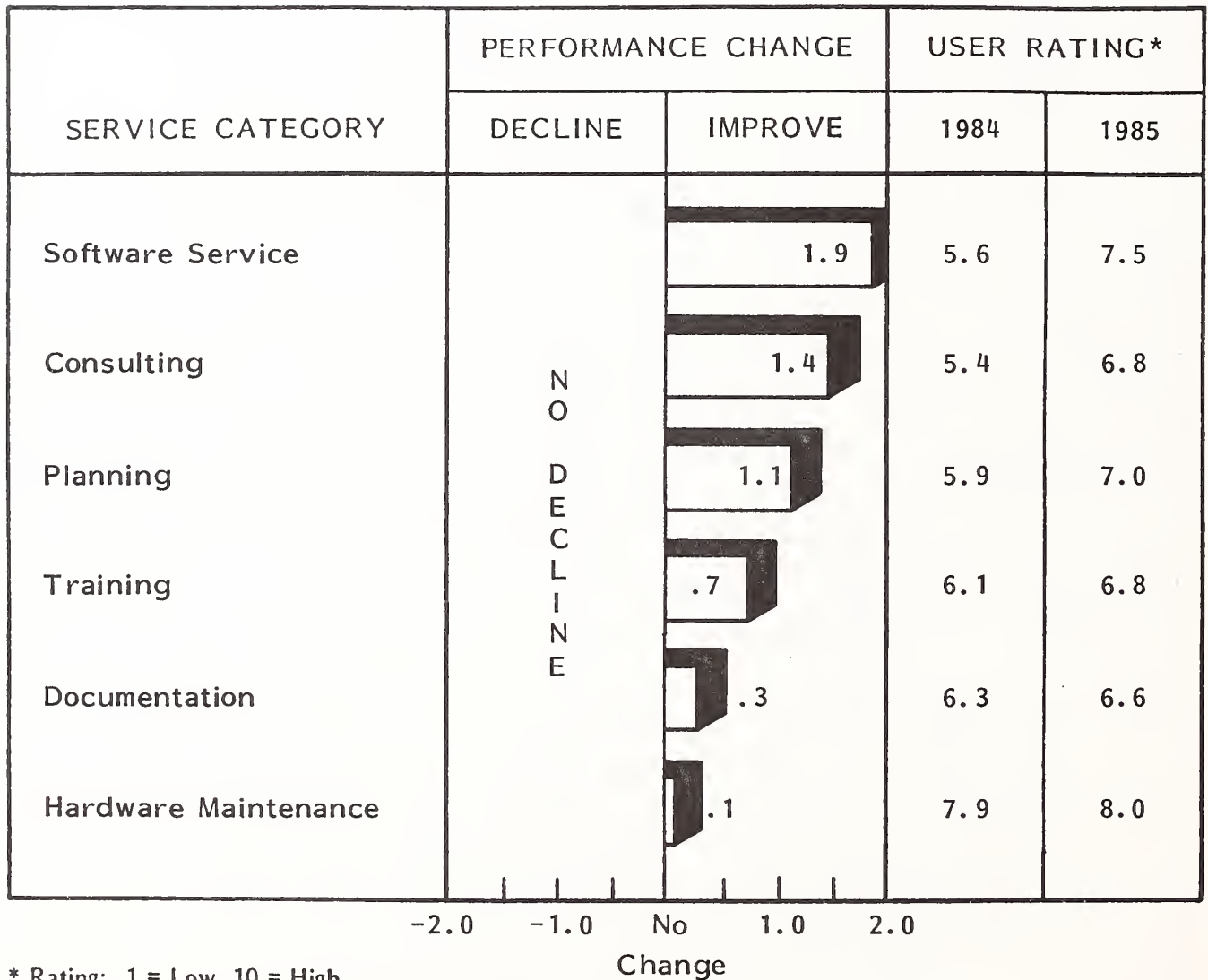


EXHIBIT XIII-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: PRIME

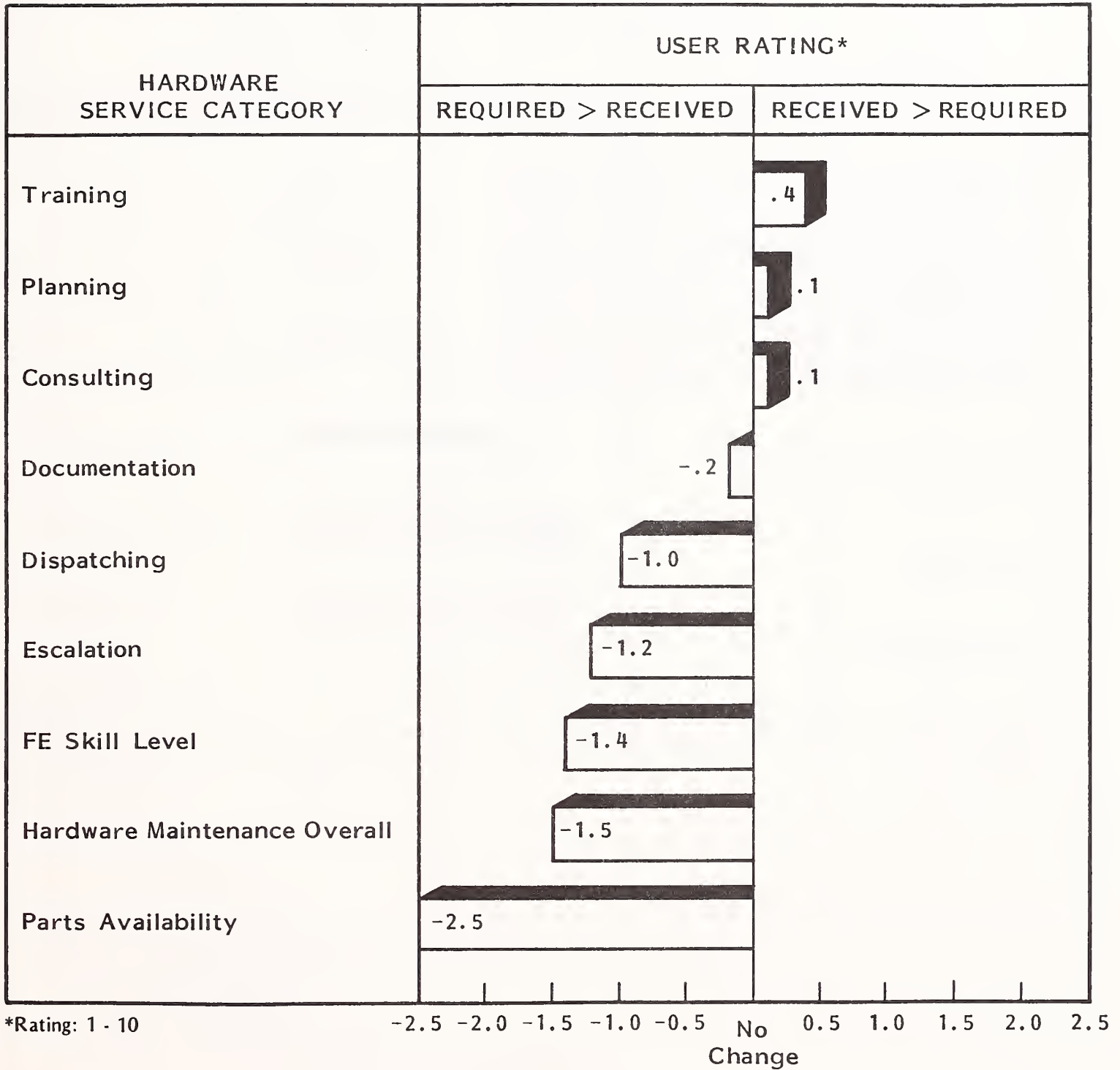


EXHIBIT XIII-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: PRIME

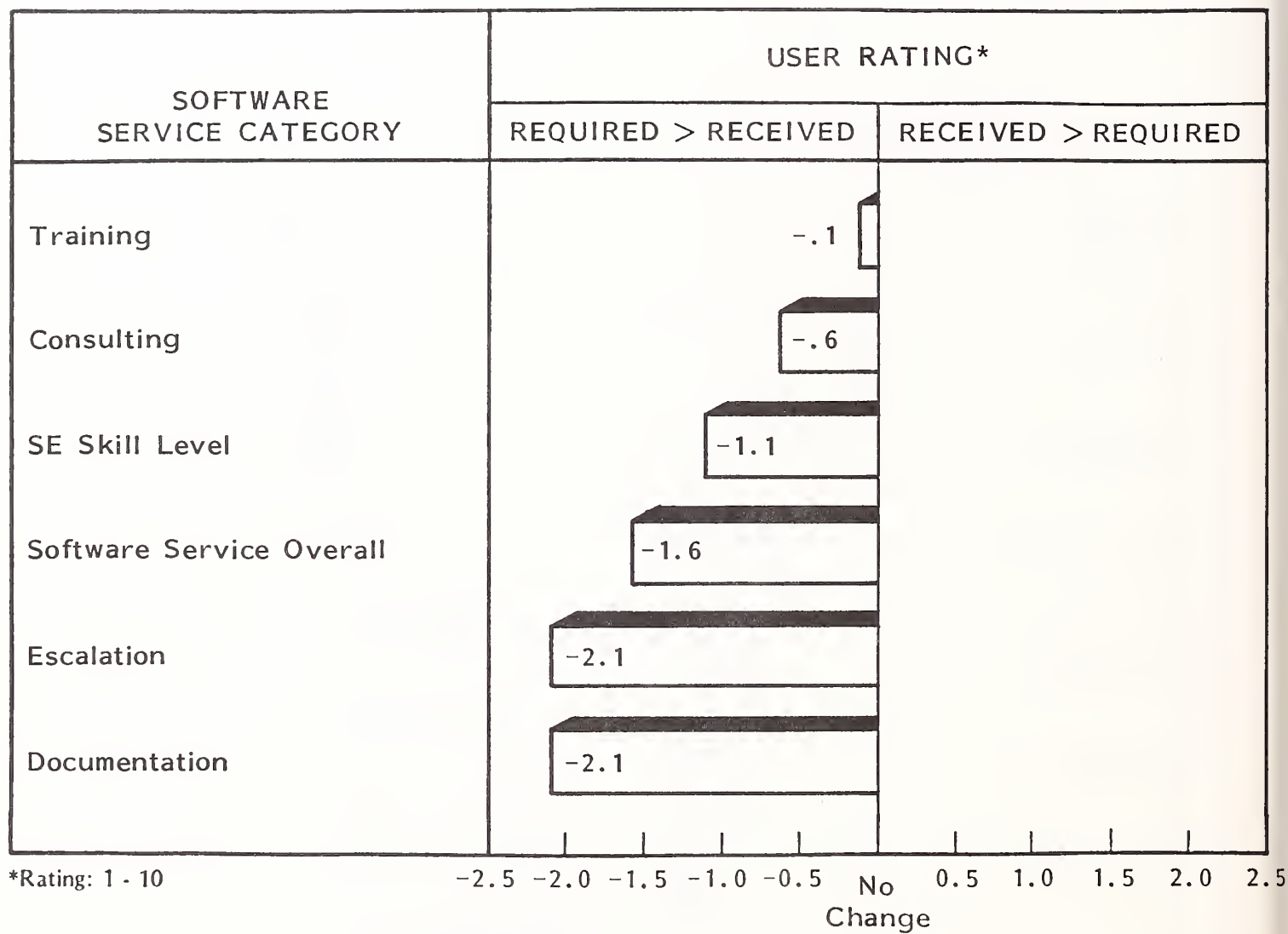



EXHIBIT XIII-4

1985 USER SATISFACTION WITH HARDWARE SERVICE: PRIME

HARDWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Hardware Maintenance Overall	9.5	8.0	35.0%
FE Skill Level	9.4	8.0	35.0
Parts Availability	9.4	6.9	31.6
Escalation	9.1	7.9	50.0
Dispatching	9.0	8.0	60.0
Planning	6.9	7.0	85.7
Documentation	6.8	6.6	56.3
Consulting	6.7	6.8	75.0
Training	6.4	6.8	53.8

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT XIII-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE:
PRIME

SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Software Service Overall	9.1	7.5	26.7
Documentation	9.1	7.0	22.2
Escalation	9.0	6.9	37.5
SE Skill Level	8.5	7.4	37.5
Consulting	7.6	7.0	57.1
Training	6.8	6.7	61.5

 A majority of users are dissatisfied with service.

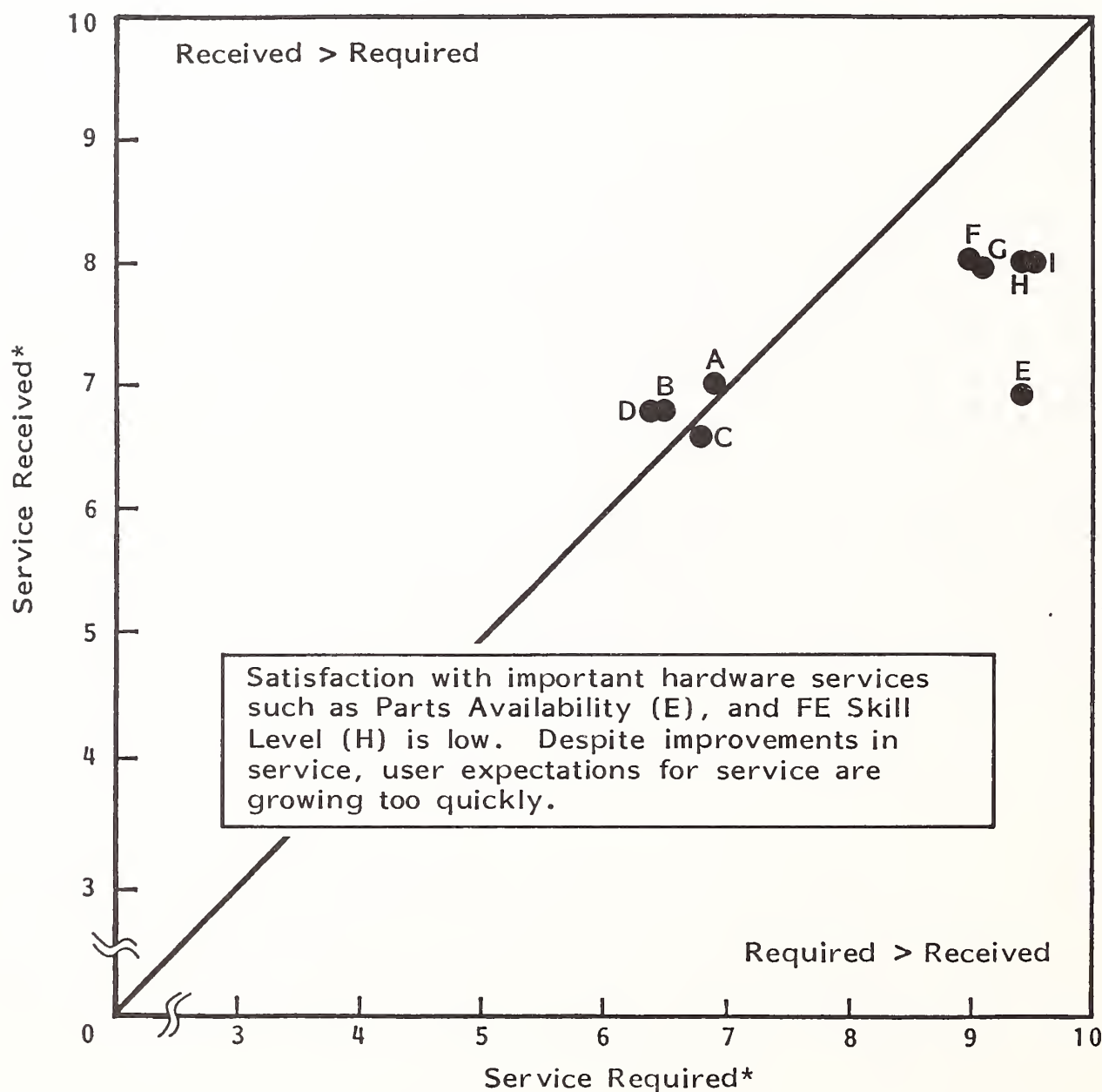
*Rating: 1 = Low, 10 = High

example, in 1985 only 35% of Prime users were satisfied with hardware support overall compared to 43% in 1984. Satisfaction with systems software support fell from 29% in 1984 to 27% in 1985.

- As noted above, Prime has been improving their service, but user expectations for services such as systems software support are increasing by as fast as 30% per year. Under these conditions, even the 20% improvement Prime achieved in software support performance is unlikely to result in improved user satisfaction rates.
- INPUT believes that Prime must address user dissatisfaction with service by improving high priority user requirements. In the area of hardware support, parts availability must be improved because it is having such a dramatic negative effect on overall satisfaction rates. Both software and hardware escalation must be improved; this will have added positive effects in that extra support of the engineer will increase user satisfaction with the FE and SE skill level.
- Exhibits XIII-6 and XIII-7 plot user requirements for hardware and software support versus the level of service actually received. The segmentation of high and low priority services is most evident in hardware support, as shown in Exhibit XIII-6. Prime users are satisfied with all but the most important services in this exhibit. Significantly, a majority of users are satisfied with dispatching and escalation (see F and G in the exhibit), although their requirements for service are not being met.
- As noted earlier, Prime's average system availability, 98.3%, is the highest in the industry, but there has been little or no perceived improvement in hardware response or repair times. As Exhibit XIII-8 demonstrates, total repair time (response and repair time) has actually declined by two-tenths of an hour since 1984.

EXHIBIT XIII-6

PRIME HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

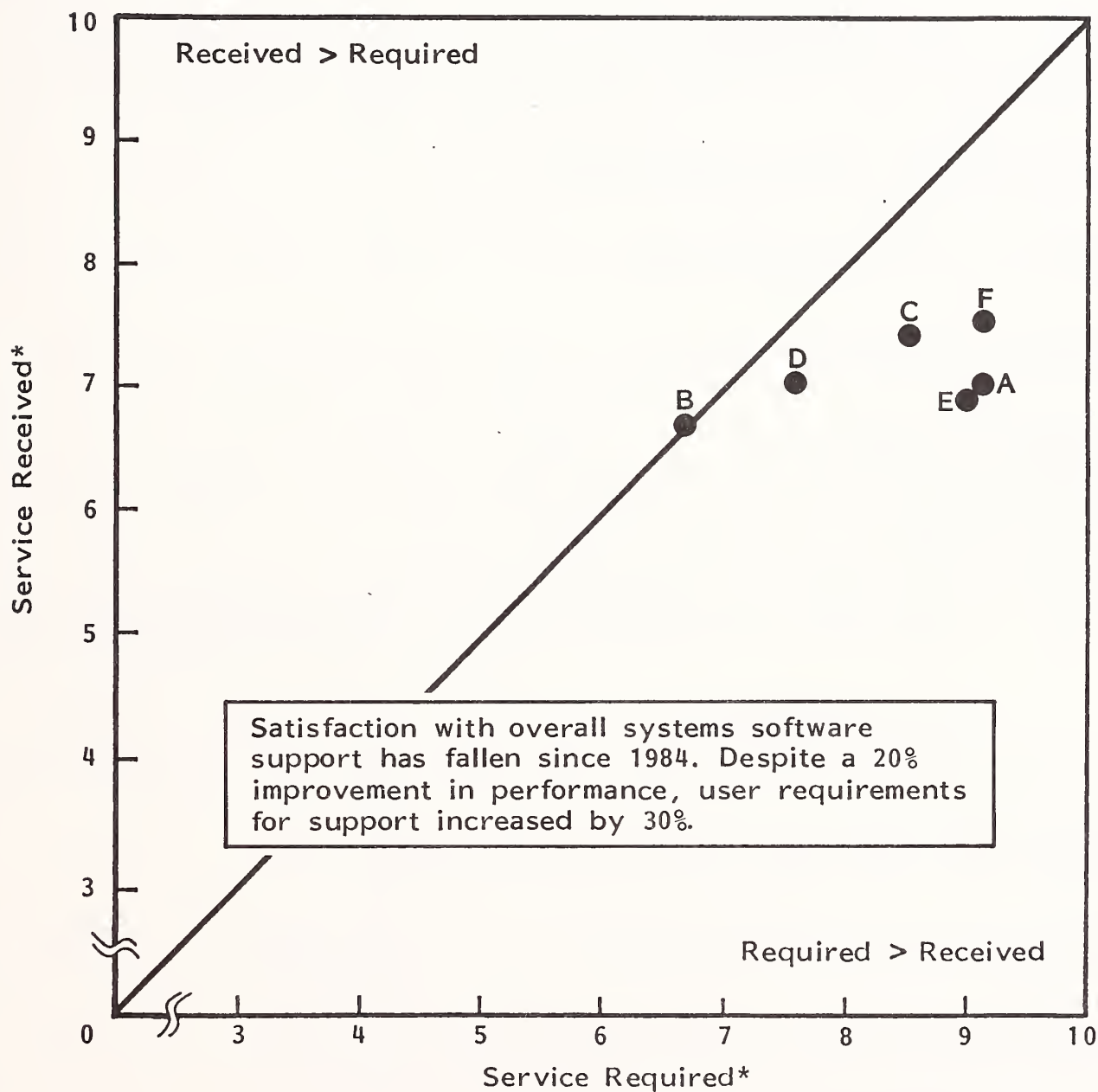


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT XIII-7

PRIME SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Service Overall

*Rating: 1 = Low, 10 = High

EXHIBIT XIII-8

HARDWARE SERVICE COMPONENT DATA:
PRIME

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	7.9
Satisfaction with System Availability	9.0
Satisfaction with Response Time	8.3
Satisfaction with Repair Time	7.9

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	2.0	1.2
Average System Availability (Percent)	93.6%	98.3%
Average Hardware Response Time (Hours)	3.7	3.9
Average Hardware Repair Time (Hours)	4.7	4.7

- Although the average number of system software interruptions has increased in 1985, Exhibit XIII-9 shows that both software response and repair time have improved. Prime users report half the system software interruptions reported on average by small-system users, but Prime's response/repair time is 32% worse than average. Overall, though, Prime's total response and repair time has improved 36% since 1984.
- Prime users are among the least price-sensitive of all small-system users, as evidenced by Exhibit XIII-10. Particularly in the area of standby coverage, increased software support, and preventive maintenance, Prime users are willing to pay substantial premiums for improved or extended service. Willingness to pay a premium for remote diagnostics and on-site spares is low; users typically believe this is the vendor's responsibility.
- Not surprisingly, Prime users are among the most willing to participate in software service. These users indicated that on a scale of 1 = low, 10 = high, they would rate their willingness to participate in software problem diagnostics and installation procedures at 9.1--the highest of all small-system users. However, if Prime decides to investigate this service delivery option, they should be advised that 65% of Prime respondents said that they expected an average discount of 24% to participate in software support.

EXHIBIT XIII-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA:
PRIME

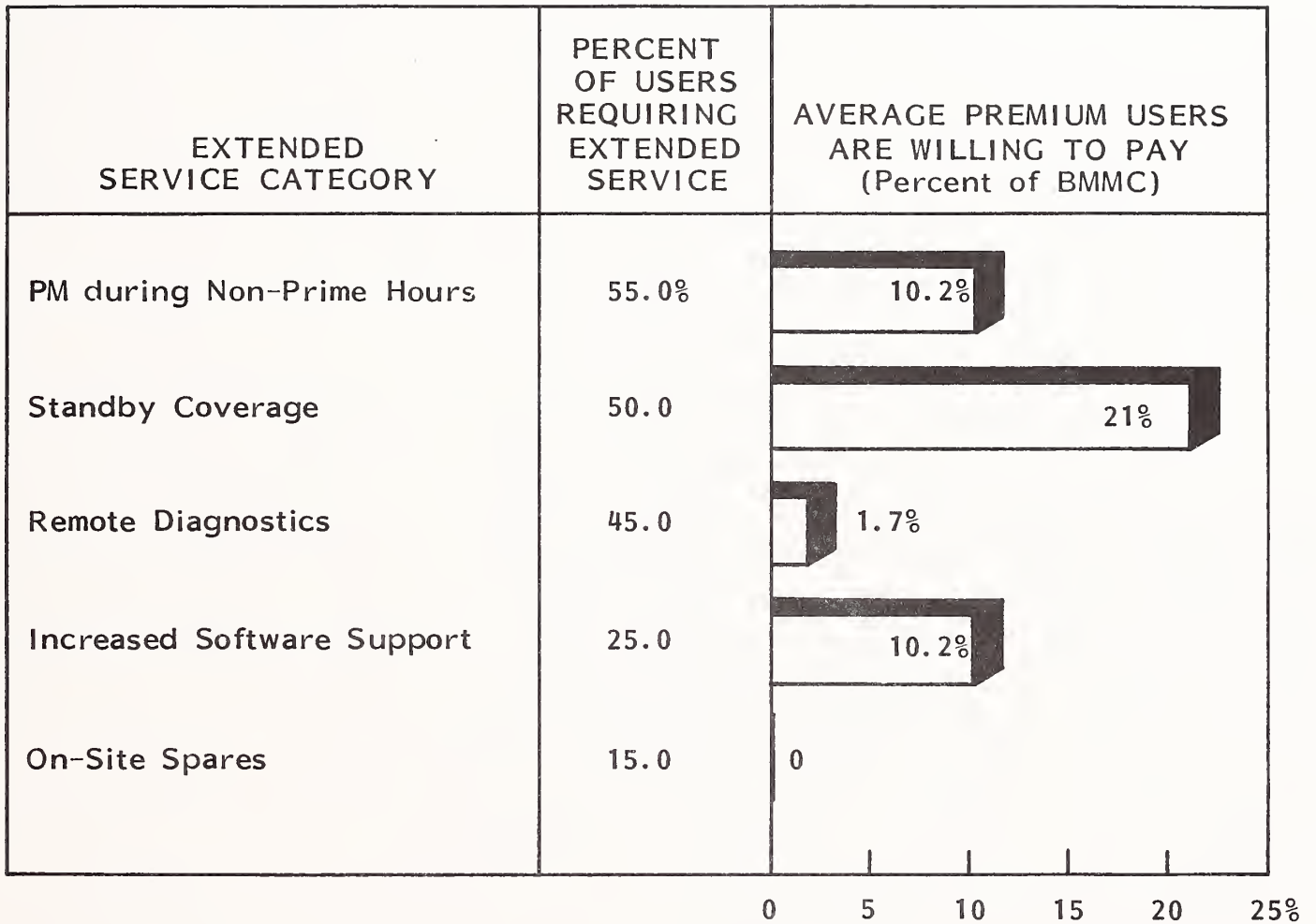
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.3
Satisfaction with Software Response Time	6.7
Satisfaction with Software Repair Time	6.6

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.1	0.3
Average Software Response Time (Hours)	18.3	7.5
Average Software Repair Time (Hours)	29.0	23.0

EXHIBIT XIII-10

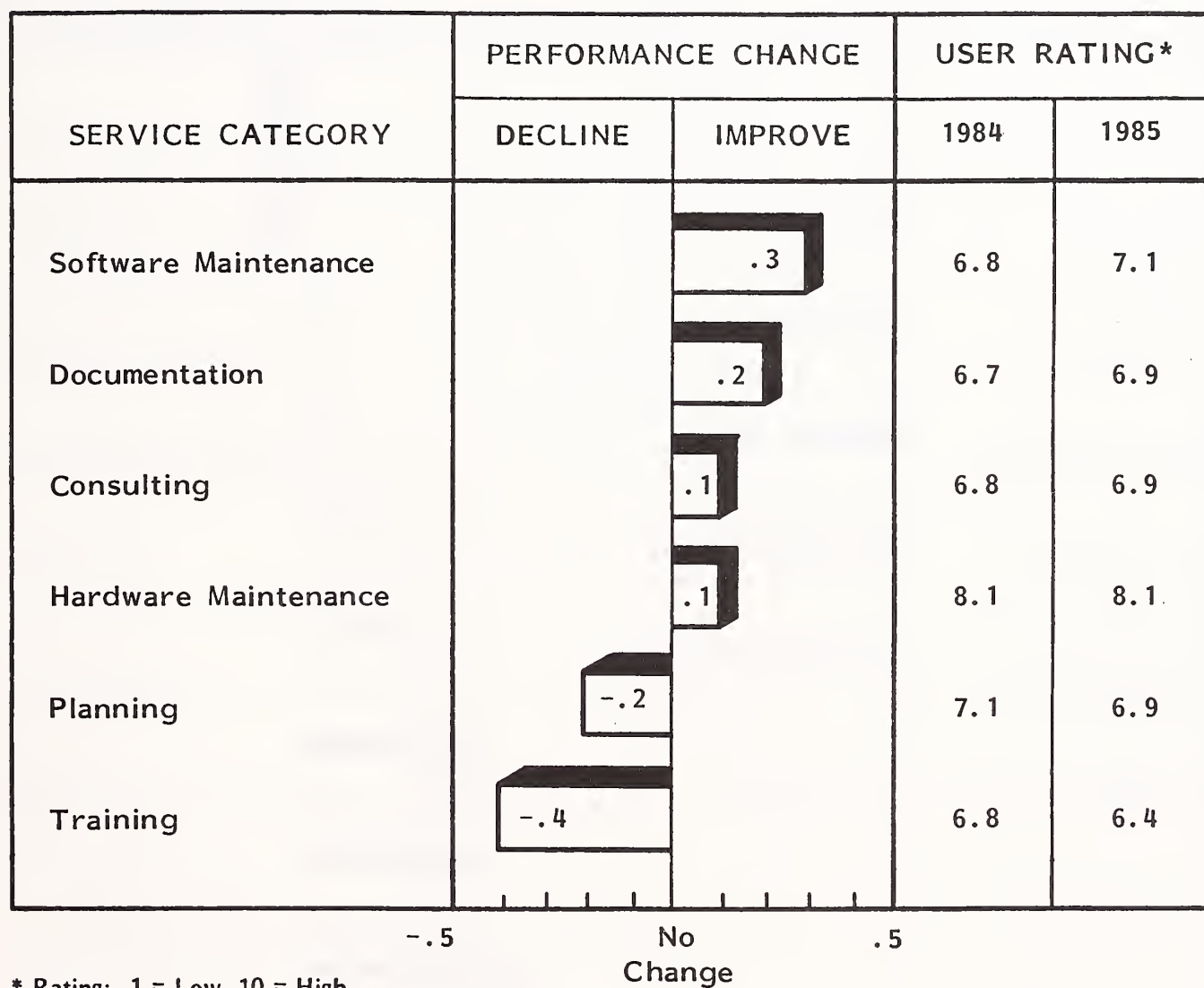
SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: PRIME



**APPENDIX A: ALL SMALL-SYSTEM VENDOR SERVICE
PERFORMANCE ANALYSIS**

EXHIBIT A-1

SERVICE PERFORMANCE AND USER RATINGS COMPARISON, 1984-1985: ALL SMALL-SYSTEM VENDORS



* Rating: 1 = Low, 10 = High

EXHIBIT A-2

VENDOR HARDWARE SERVICE STRENGTHS AND WEAKNESSES: ALL SMALL-SYSTEM VENDORS

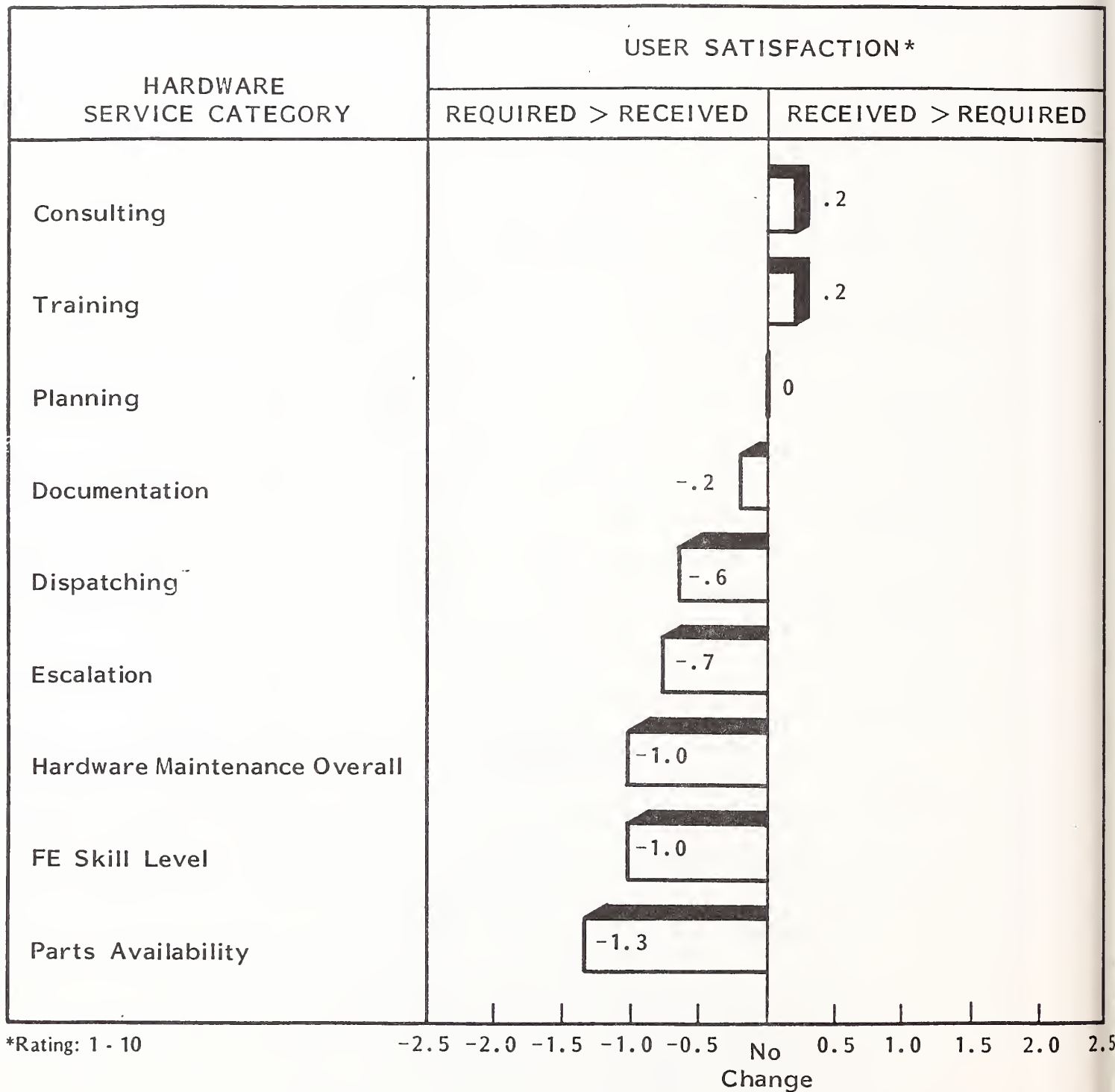


EXHIBIT A-3

VENDOR SOFTWARE SERVICE STRENGTHS AND WEAKNESSES: ALL SMALL-SYSTEM VENDORS

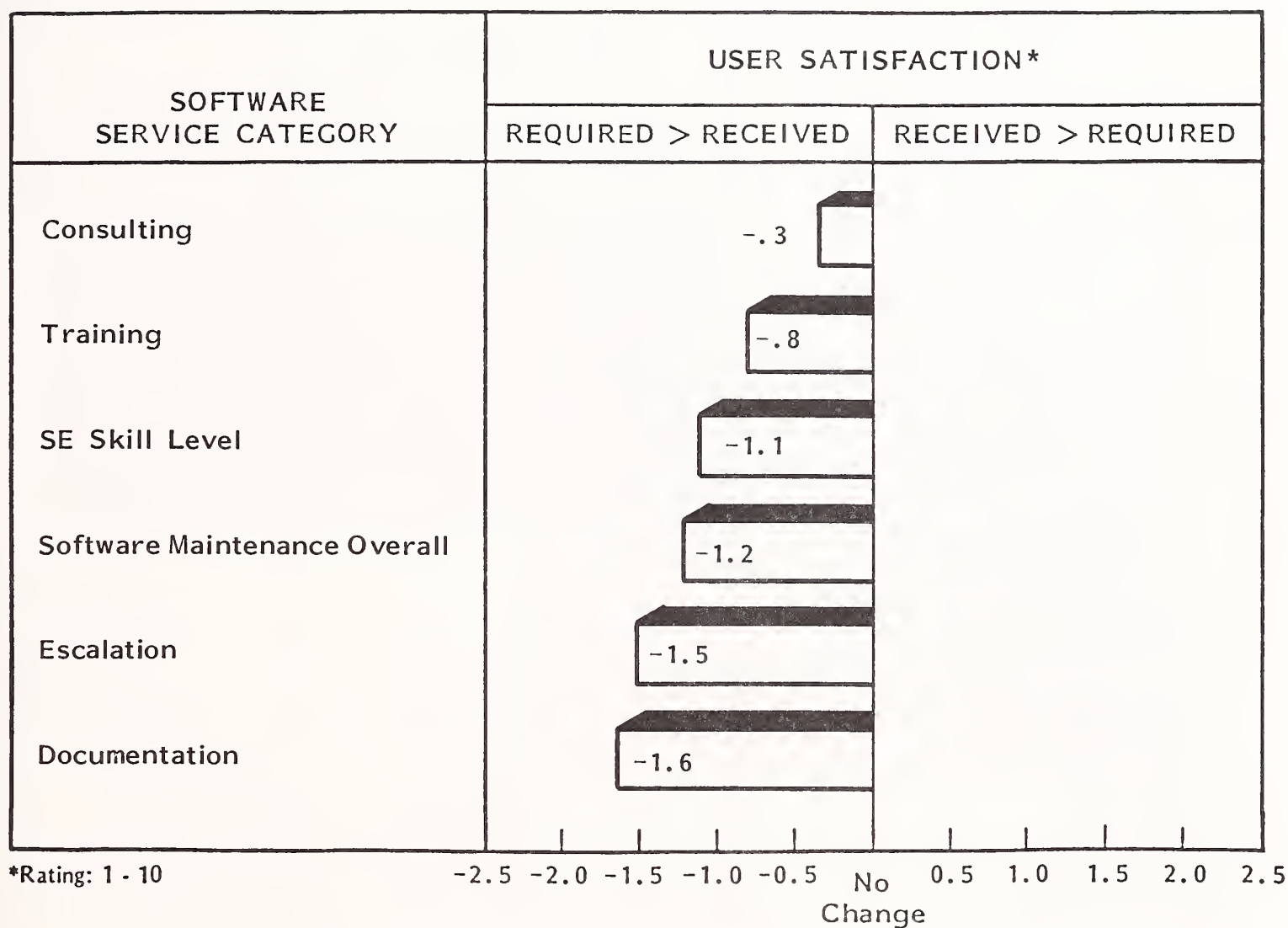


EXHIBIT A-4

1985 USER SATISFACTION WITH HARDWARE SERVICE: ALL SMALL-SYSTEM VENDORS

SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
FE Skill Level	9.2	8.2	46.7%
Hardware Maintenance Overall	9.1	8.1	45.1
Parts Availability	8.8	7.5	45.3
Dispatching	8.6	8.0	59.9
Escalation	8.4	7.7	55.2
Documentation	7.1	6.9	58.2
Planning	6.9	6.9	61.3
Consulting	6.7	6.9	61.7
Training	6.2	6.4	61.5

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT A-5

1985 USER SATISFACTION WITH SYSTEMS SOFTWARE SERVICE: ALL SMALL-SYSTEM VENDORS

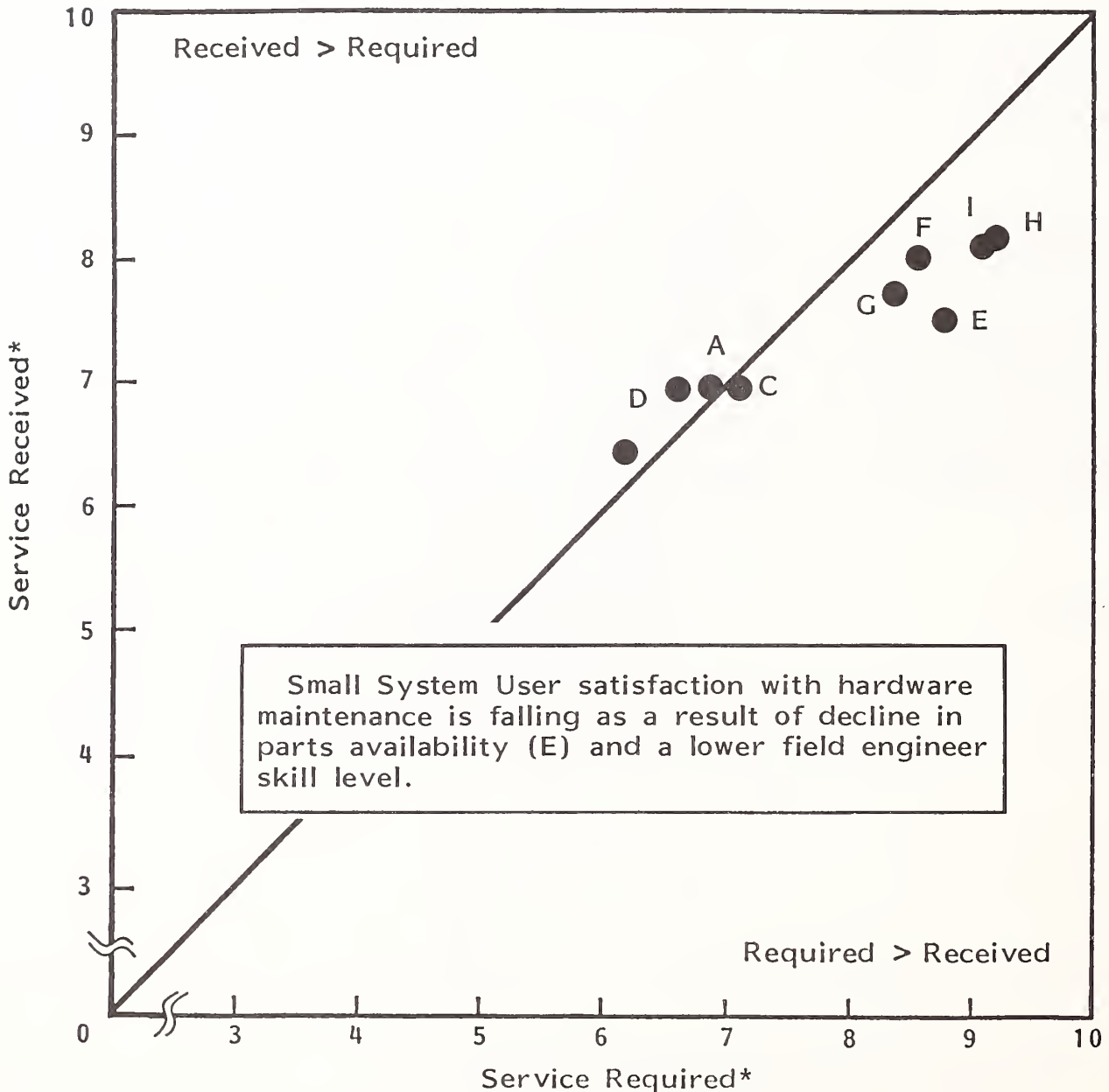
SOFTWARE SERVICE CATEGORY	LEVEL OF SERVICE		PERCENT OF USERS SATISFIED
	REQUIRED*	RECEIVED*	
Documentation	8.7	7.1	28.9%
Software Maintenance	8.3	7.1	41.1
SE Skill Level	7.9	6.8	47.6
Escalation	7.8	6.5	43.8
Training	7.3	6.5	44.9
Consulting	6.8	6.5	54.2

 A majority of users are dissatisfied with service.

*Rating: 1 = Low, 10 = High

EXHIBIT A-6

ALL SMALL-SYSTEM VENDORS HARDWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED

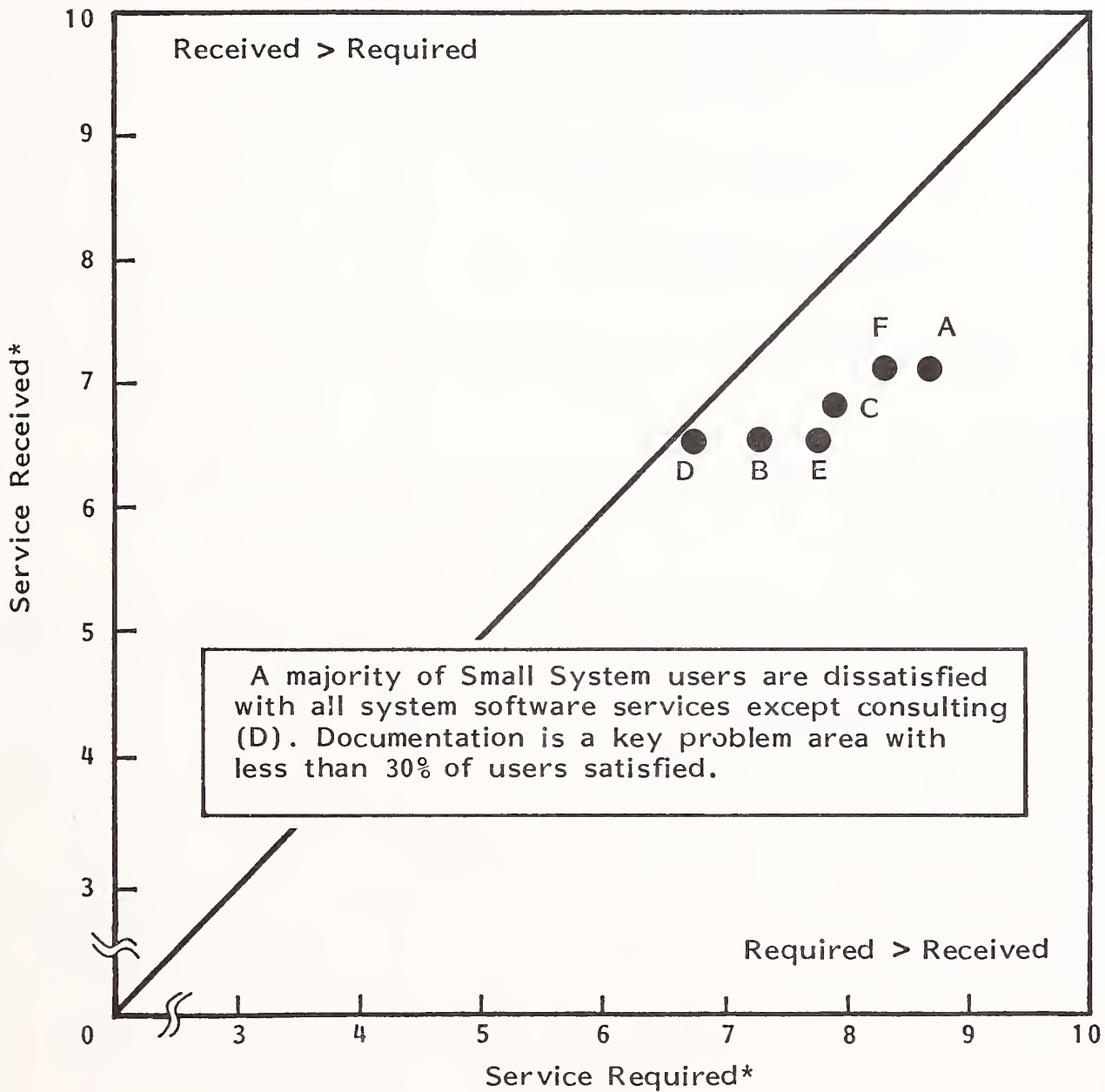


- | | |
|------------------------|----------------------------------|
| A = Planning | F = Dispatching |
| B = Consulting | G = Escalation |
| C = Documentation | H = FE Skill Level |
| D = Training | I = Hardware Maintenance Overall |
| E = Parts Availability | |

*Rating: 1 = Low, 10 = High

EXHIBIT A-7

ALL SMALL-SYSTEM VENDORS SYSTEMS SOFTWARE SUPPORT: USER REQUIREMENTS VERSUS LEVEL OF SERVICE RECEIVED



A = Documentation	D = Consulting
B = Training	E = Escalation
C = SE Skill Level	F = Software Maintenance Overall

*Rating: 1 = Low, 10 = High

EXHIBIT A-8

HARDWARE SERVICE COMPONENT DATA: ALL SMALL-SYSTEM VENDORS

HARDWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Hardware Service	8.2
Satisfaction with System Availability	8.6
Satisfaction with Response Time	8.3
Satisfaction with Repair Time	8.1

*Rating: 1 = Low, 10 = High

HARDWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Hardware Interruptions per Month	2.0	1.2
Average System Availability (Percent)	92.3%	96.2%
Average Hardware Response Time (Hours)	6.1	3.6
Average Hardware Repair Time (Hours)	5.5	3.9

EXHIBIT A-9

SYSTEMS SOFTWARE SERVICE COMPONENT DATA: ALL SMALL-SYSTEM VENDORS

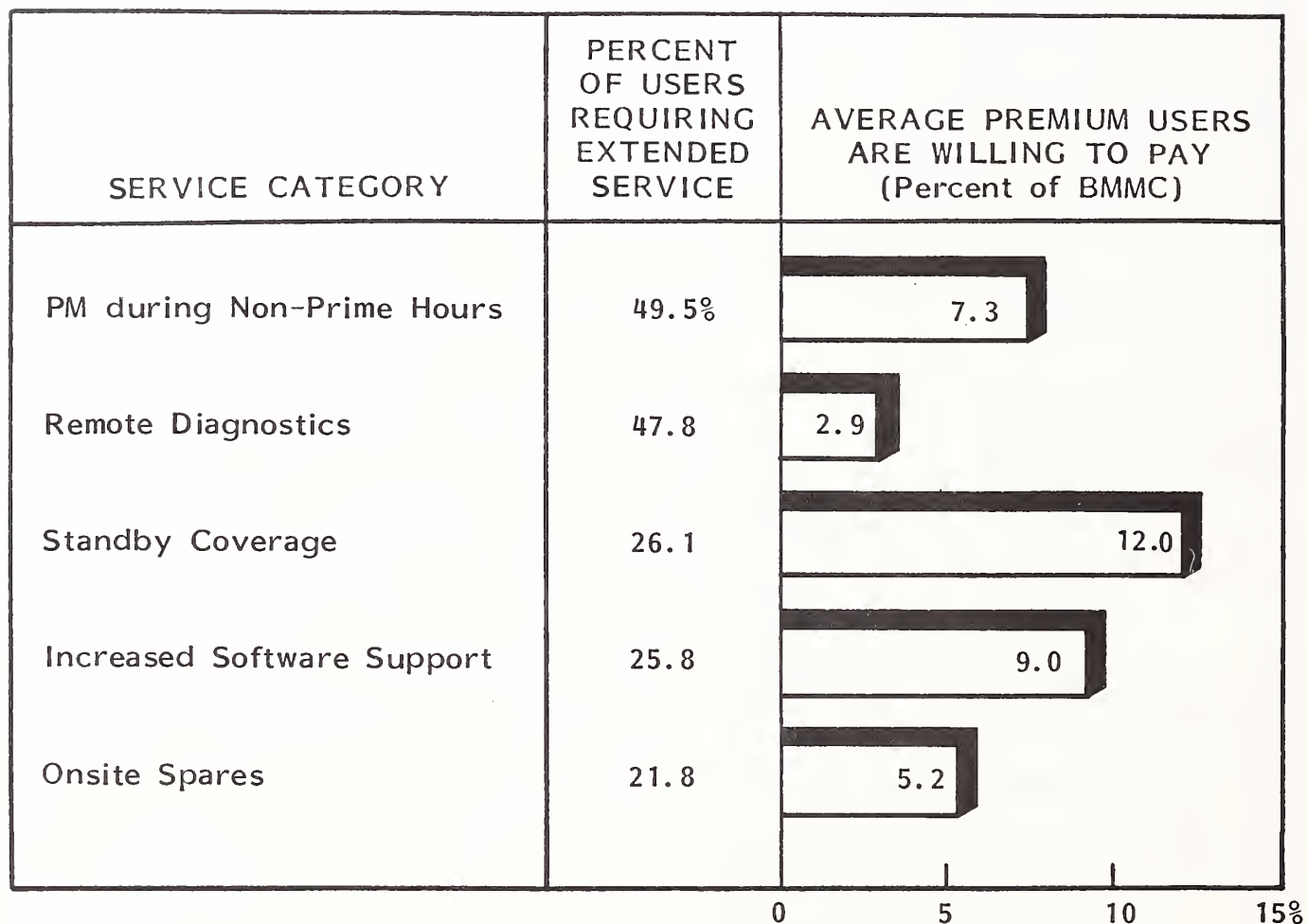
SOFTWARE SERVICE COMPONENT	1985 USER RATING*
Overall Satisfaction with Software Service	7.2
Satisfaction with Software Response Time	7.2
Satisfaction with Software Repair Time	7.0

*Rating: 1 = Low, 10 = High

SOFTWARE SERVICE COMPONENT	VENDOR PERFORMANCE	
	1984	1985
Average Number of Software Interruptions per Month	0.7	0.6
Average Software Response Time (Hours)	11.1	7.4
Average Software Repair Time (Hours)	17.4	15.7

EXHIBIT A-10

SMALL-SYSTEM USER REQUIREMENTS FOR EXTENDED SERVICES: ALL SMALL-SYSTEM VENDORS



APPENDIX B: SUPERMINICOMPUTER SERVICE PERFORMANCE ANALYSIS

APPENDIX B: SUPERMINICOMPUTER SERVICE PERFORMANCE ANALYSIS

- Exhibits B-1 through B-5 list user satisfaction with, and actual vendor performance on superminicomputers. The vendors and products included are:
 - DEC--VAX 11/750 and 11/780.
 - Data General--MV Series.
 - IBM--System 38.
 - NCR--9300.
 - Perkin-Elmer--32XX.
 - Prime--9950, 2250, 850, and 750.
- DEC, Data General, IBM, and NCR are also represented in the traditional minicomputer product lines and consequently the data for these vendors in Appendix B will not correspond to the data in the main body of the report.

EXHIBIT B-1

USER SATISFACTION WITH SERVICE:
SUPERMINICOMPUTER VENDORS

VENDOR	SATISFACTION* WITH:		
	OVERALL SERVICE	HARDWARE SERVICE	SYSTEM SOFTWARE SERVICE
Data General	8.0	8.1	6.7
DEC	7.7	8.2	7.1
IBM	8.5	8.4	7.6
NCR	8.7	8.8	7.6
Perkin-Elmer	7.4	8.3	6.4
Prime	7.9	7.9	7.3

* Rating: 1 = Low, 10 = High

EXHIBIT B-2

SYSTEM AVAILABILITY* AND SYSTEM INTERRUPTION: SUPERMINICOMPUTER VENDORS

VENDOR	PERCENT SYSTEM AVAILABILITY	NUMBER OF SYSTEM INTERRUPTIONS PER MONTH
Data General	97.3	2.0
DEC	96.6	2.5
IBM	97.3	0.7
NCR	93.5	2.8
Perkin-Elmer	96.3	4.7
Prime	98.3	2.6

* System availability as a percent of scheduled uptime.

EXHIBIT B-3

SYSTEM INTERRUPTIONS BY CAUSE:
SUPERMINICOMPUTER VENDORS

VENDOR	PERCENT HARDWARE INTERRUPTIONS	PERCENT SOFTWARE INTERRUPTIONS	PERCENT OTHERS
Data General	37.5	46.4	16.1
DEC	67.0	30.1	2.9
IBM	54.9	15.7	29.4
NCR	49.7	50.2	0.0
Perkin-Elmer	70.7	29.3	0.0
Prime	45.2	10.6	44.2

EXHIBIT B-4

HARDWARE RESPONSE AND REPAIR TIME: SUPERMINICOMPUTER VENDORS

VENDORS	HARDWARE RESPONSE TIME (Hours)	HARDWARE REPAIR TIME (Hours)
Data General	4.2	2.7
DEC	2.4	3.9
IBM	1.4	2.9
NCR	5.2	2.8
Perkin-Elmer	5.6	2.6
Prime	3.9	4.7

EXHIBIT B-5

SYSTEMS SOFTWARE RESPONSE AND REPAIR TIME:
SUPERMINICOMPUTER VENDORS

VENDOR	SYSTEMS SOFTWARE	
	RESPONSE TIME (Hours)	REPAIR TIME (Hours)
Data General	2.2	26.0
DEC	9.5	10.9
IBM	6.2	9.4
NCR	7.2	7.5
Perkin-Elmer	5.6	30.5
Prime	7.5	23.0

APPENDIX C: TRADITIONAL MINICOMPUTER SERVICE
PERFORMANCE DATA

APPENDIX C: TRADITIONAL MINICOMPUTER SERVICE PERFORMANCE DATA

- Exhibits C-1 through C-5 list user satisfaction with, and actual vendor service performance on, traditional minicomputers. As defined in the introduction, these products include 16-bit, multiuser, and business/scientific systems.
- The data in Appendix C is included to facilitate the analysis of this market segment, analysis which is impeded in the main body of the report by the inclusion of superminicomputers.
- The vendors and products included in Appendix C are:
 - Burroughs--B19XX, B9XX, B9X.
 - Datapoint--86XX, 88XX.
 - DEC--PDP 11/70.
 - Data General--Nova, Eclipse.
 - Honeywell--DPS/6.
 - Hewlett Packard--3000.
 - IBM--Series 1, System 36.
 - NCR--9100.

EXHIBIT C-1

USER SATISFACTION WITH SERVICE: MINICOMPUTER VENDORS

VENDOR	SATISFACTION WITH*:		
	OVERALL SERVICE	HARDWARE SERVICE	SOFTWARE SERVICE
Burroughs	8.3	8.3	8.2
Data General	7.9	7.9	6.4
Datapoint	7.5	7.6	6.8
DEC	8.2	8.4	6.7
Four-Phase	7.7	8.0	7.1
Hewlett-Packard	8.3	8.5	7.1
Honeywell	7.6	8.2	6.8
IBM	8.4	8.4	7.3
NCR	8.5	8.8	7.6

* Rating: 1 = Low, 10 = High

EXHIBIT C-2

SYSTEM AVAILABILITY* AND SYSTEM INTERRUPTIONS: MINICOMPUTER VENDORS

VENDOR	PERCENT SYSTEM AVAILABILITY	NUMBER OF SYSTEM INTERRUPTIONS PER MONTH
Burroughs	97.6%	1.6
Data General	94.8	2.7
Datapoint	95.2	2.0
DEC	95.7	1.6
Four-Phase	95.7	1.9
Hewlett-Packard	96.8	1.1
Honeywell	96.2	2.7
IBM	97.2	0.9
NCR	97.8	1.0

* Rating: 1 = Low, 10 = High

EXHIBIT C-3

SYSTEM INTERRUPTIONS BY CAUSE:
MINICOMPUTER VENDORS

VENDOR	PERCENT HARDWARE INTERRUPTIONS	PERCENT SOFTWARE INTERRUPTIONS	PERCENT OTHERS
Burroughs	57.1%	16.9%	26.0%
Data General	66.0	32.9	1.1
Datapoint	69.3	23.1	7.6
DEC	62.0	38.0	0.0
Four-Phase	34.9	28.1	37.0
Hewlett-Packard	75.5	24.4	0.0
Honeywell	65.2	34.8	0.0
IBM	65.8	25.0	9.2
NCR	45.0	49.0	6.0

EXHIBIT C-4

HARDWARE RESPONSE AND REPAIR TIME: MINICOMPUTER VENDORS

VENDOR	HARDWARE RESPONSE TIME (Hours)	HARDWARE REPAIR TIME (Hours)
Burroughs	1.8	2.2
Data General	3.6	3.5
Datapoint	2.5	6.8
DEC	2.5	3.7
Four-Phase	2.9	1.9
Hewlett-Packard	4.3	3.0
Honeywell	2.7	2.8
IBM	2.8	3.3
NCR	2.9	1.4

EXHIBIT C-5

SYSTEMS SOFTWARE RESPONSE AND REPAIR TIME:
MINICOMPUTER VENDORS

VENDORS	SYSTEMS SOFTWARE	
	RESPONSE TIME (Hours)	REPAIR TIME (Hours)
Burroughs	9.3	12.8
Data General	*	*
Datapoint	16.3	12.9
DEC	4.3	13.4
Four-Phase	3.2	11.5
Hewlett-Packard	3.0	9.4
Honeywell	4.6	16.8
IBM	4.2	15.4
NCR	2.8	11.3

* Insuficiant Response

APPENDIX D: USER QUESTIONNAIRE

APPENDIX D

DEMOGRAPHICS

1. CPU Manufacturer _____
2. CPU Model _____
3. CPU Installed Age (Years, e.g. 4.5 Years) _____
4. Current Maintenance Coverage on CPU (e.g. BMMC, T&M, 24 X 7)

5. Length of Service Relationship With Current Vendor (Years, e.g. 3.9) _____
6. Distance from Service Outlet to Users Site (Miles) _____
7. On a scale of 1 to 10, where 1 = low and 10 = high, please rate your service vendor in the following categories:
 - a. Overall satisfaction with service _____
 - b. Satisfaction with hardware service _____
 - c. Satisfaction with system software service _____
 - d. Price of service _____
8. If your company were to purchase a computer today, how important would each of these features be (1 to 10) in the purchase decision process:
 - a. System price _____
 - b. System capabilities _____
 - c. Reliability _____
 - d. Maintenance response time _____
 - e. Maintenance repair time _____
 - f. Price of maintenance _____
 - g. Vendor reputation for maintenance _____

9. How many hours a week is your system typically used? _____
10. What percent uptime (on average over the past 6 months) are you currently experiencing?
_____ %
11. How many system interruptions do you have each month? _____
- a. What percent of system interruptions are hardware related? _____ %
- b. Software related? _____ %

SOFTWARE

12. a. By which of the following methods are you currently receiving systems support?
- b. (If yes on "a.") how satisfied are you, on a scale of 1 to 10 with the different methods of software support?

	a. (Yes/No)	b. (1 to 10)
1. Hardware engineer, on-site	_____	_____
2. Software engineer, on-site	_____	_____
3. Remote from national support center	_____	_____
4. Remote form regional support center	_____	_____
5. Mail	_____	_____
6. Other _____	_____	_____

13. On average, how many hours does it take your vendor to respond to a systems software problem?

14. An how many hours to resolve systems software problems?

15. How satisfied (on a scale of 1 to 10) are you with:
- a. Systems software response time _____
- b. Systems software repair time _____

16. On a scale of 1 to 10, how willing would you be to participate in systems software support maintenance by the following methods?
- Working with a support center to diagnose problem _____
 - Installing patches or modifications _____
 - Installing new releases _____
17. a. Would you expect a discount in the cost of service for participating in software maintenance? Yes _____ No _____
- b. If yes, how much of a discount would you expect? _____
18. a. Please rate on a scale of 1 to 10 your requirements for the following systems software goods and services:
- b. Please rate on a scale of 1 to 10, your current level of satisfaction with the systems software goods and services you receive from your vendor:
- | <u>Vendor Goods
and Services</u> | <u>a.
Requirement</u> | <u>b.
Current Level</u> |
|--|---------------------------|-----------------------------|
| 1. Software documentation | _____ | _____ |
| 2. Software training | _____ | _____ |
| 3. Skilled software engineer available | _____ | _____ |
| 4. Software consulting | _____ | _____ |
| 5. Software escalation | _____ | _____ |
| 6. Software maintenance | _____ | _____ |

HARDWARE

19. How many hours does it take your vendor to respond (on-site) once you have placed the first call?
- _____

20. How many hours does it take the vendor to repair the equipment once the FE is on-site?
- _____

21. Again, on a scale of 1 to 10, how satisfied are you with:

- a. System availability _____
- b. Hardware response time _____
- c. Hardware repair time _____

- 22a. Please rate, on a scale of 1 to 10, your requirements for the following hardware goods and services:

- b. Please rate your current level of satisfaction with the services you receive from your hardware maintenance vendor:

<u>Vendor Goods and Services</u>	<u>Requirement (1 to 10)</u>	<u>Current Level (1 to 10)</u>
1. Hardware capacity planning	_____	_____
2. Hardware consulting	_____	_____
3. Hardware documentation	_____	_____
4. Hardware training	_____	_____
5. Parts availability	_____	_____
6. Dispatching	_____	_____
7. Escalation	_____	_____
8. Hardware maintenance	_____	_____
9. FE skill level	_____	_____

THIRD-PARTY MAINTENANCE

23. Do you currently use third-party maintenance on any of you DP equipment?

☐ Yes ☐ No

24. (If no), have you considered using TPM? ☐ Yes ☐ No

25. (If yes on 23) for what product(s) are you using third-party maintenance?

26. On a scale of 1 to 10, how satisfied are you with the TPM service your are now receiving? (if yes on 22)
- _____

PRICING

- 27a. Do you have a requirement for any of the following services?
- b. On a scale of 1 to 10, how important is your requirement for the service?
- c. What would you consider a reasonable premium for these services (over and above your BMMC)?

<u>Service</u>	<u>a.</u> <u>Yes/No</u>	<u>b.</u> <u>1 to 10</u>	<u>c.</u> <u>Percent</u>
1. Stand-by coverage	_____	_____	_____ %
2. On-site spare parts	_____	_____	_____ %
3. Remote diagnostics	_____	_____	_____ %
4. PM (preventive maintenance) during non-prime hours)	_____	_____	_____ %
5. Full-time on-site engineer	_____	_____	_____ %
6. Increased software support	_____	_____	_____ %

Thank You.

APPENDIX E: DATA BASE FORMAT

APPENDIX E: DATA BASE FORMAT

A. OVERVIEW OF THE DATA BASE

- As mentioned in the Introduction, INPUT conducted 372 interviews of small-system users as the basis of this report. Each interview was conducted over the telephone and recorded on questionnaire forms like the one in Appendix D. Overall, each questionnaire contains 100 data items along with 16 fields of demographic data.
- After the questionnaires were completed and verified, the user responses were entered into an IBM personal computer using dBASE III, a relational data base management system produced by Ashton Tate (Culver City, CA). The resulting data base has 114 fields corresponding to individual questions in the questionnaire in Appendix D.
- The principal advantage of dBASE III over dBASE II, the data base package previously used by INPUT, is that all data can be included into one file as opposed to five files used with dBASE II. INPUT's 1985 small-system user requirement data is stored in a file titled "FUA2.DBF." The structure of the data base is included in Exhibit E-1.

EXHIBIT E-1

FUA2.DBF FILE STRUCTURE

FIELD NUMBER	FIELD NAME	TYPE	WIDTH
1	CATNO	Numeric	6
2	COMPANY	Character	30
3	STREET	Character	30
4	ROOM	Character	20
5	CITY	Character	25
6	STATE	Character	2
7	ZIP	Character	5
8	GEOCODE	Character	2
9	CONTACT	Character	30
10	TITLE	Character	30
11	AREA	Character	3
12	PHONE	Character	10
13	INDUSTRY	Character	25
14	Q1	Character	15
15	Q2	Character	10
16	Q3	Numeric	4
17	Q4	Character	15
18	Q5	Numeric	4
19	Q6	Numeric	4
20	Q7A	Numeric	2
21	Q7B	Numeric	2
22	Q7C	Numeric	2
23	Q7D	Numeric	2
24	Q8A	Numeric	2
25	Q8B	Numeric	2
26	Q8C	Numeric	2
27	Q8D	Numeric	2
28	Q8E	Numeric	2
29	Q8F	Numeric	2
30	Q8G	Numeric	2
31	Q9	Numeric	3
32	Q10	Numeric	4
33	Q11	Numeric	2
34	Q11A	Numeric	3
35	Q11B	Numeric	3
36	Q12A1	Numeric	1
37	Q12A2	Numeric	1
38	Q12A3	Numeric	1
39	Q12A4	Numeric	1
40	Q12A5	Numeric	1
41	Q12A6	Numeric	1
42	Q12B1	Numeric	2
43	Q12B2	Numeric	2
44	Q12B3	Numeric	2
45	Q12B4	Numeric	2
46	Q12B5	Numeric	2
47	Q12B6	Numeric	2
48	Q12OTHER	Character	20
49	Q13	Numeric	5
50	Q14	Numeric	5
51	Q15A	Numeric	2
52	Q15B	Numeric	2
53	Q16A	Numeric	2
54	Q16B	Numeric	2
55	Q16C	Numeric	2
56	Q17A	Numeric	1
57	Q17B	Numeric	5

FIELD NUMBER	FIELD NAME	TYPE	WIDTH
58	Q18A1	Numeric	2
59	Q18A2	Numeric	2
60	Q18A3	Numeric	2
61	Q18A4	Numeric	2
62	Q18A5	Numeric	2
63	Q18A6	Numeric	2
64	Q18B1	Numeric	2
65	Q18B2	Numeric	2
66	Q18B3	Numeric	2
67	Q18B4	Numeric	2
68	Q18B5	Numeric	2
69	Q18B6	Numeric	2
70	Q19	Numeric	5
71	Q20	Numeric	5
72	Q21A	Numeric	2
73	Q21B	Numeric	2
74	Q21C	Numeric	2
75	Q22A1	Numeric	2
76	Q22A2	Numeric	2
77	Q22A3	Numeric	2
78	Q22A4	Numeric	2
79	Q22A5	Numeric	2
80	Q22A6	Numeric	2
81	Q22A7	Numeric	2
82	Q22A8	Numeric	2
83	Q22A9	Numeric	2
84	Q22B1	Numeric	2
85	Q22B2	Numeric	2
86	Q22B3	Numeric	2
87	Q22B4	Numeric	2
88	Q22B5	Numeric	2
89	Q22B6	Numeric	2
90	Q22B7	Numeric	2
91	Q22B8	Numeric	2
92	Q22B9	Numeric	2
93	Q23	Numeric	1
94	Q24	Numeric	1
95	Q25	Character	30
96	Q26	Numeric	2
97	Q27A1	Numeric	1
98	Q27A2	Numeric	1
99	Q27A3	Numeric	1
100	Q27A4	Numeric	1
101	Q27A5	Numeric	1
102	Q27A6	Numeric	1
103	Q27B1	Numeric	2
104	Q27B2	Numeric	2
105	Q27B3	Numeric	2
106	Q27B4	Numeric	2
107	Q27B5	Numeric	2
108	Q27B6	Numeric	2
109	Q27C1	Numeric	3
110	Q27C2	Numeric	3
111	Q27C3	Numeric	3
112	Q27C4	Numeric	3
113	Q27C5	Numeric	3
114	Q27C6	Numeric	3
Total			518

B. ANALYSIS OF THE DATA BASE FILES

- INPUT utilizes ABSTAT, a statistical analysis package designed to "read" dBASE III files and to analyze the data in the small-system user requirements file, FUA2.DBS. ABSTAT is produced by Anderson-Bell (Carson City, CO).
- Time and space constraints prevented INPUT from accessing any but the most obvious statistical conclusions resulting from the data in the file FUA2.DBF. Some of the statistical analysis "cuts" that looked promising include:
 - Analysis of service performance by region.
 - Effect of installed age of CPU on system availability and service performance.
 - Detailed analysis of service performance by individual and competing products.
- Clients that wish to have access to the raw data resulting from the 372 questionnaire survey of small-system users should request the diskette by writing to INPUT's main offices in Mountain View (CA). Unless told otherwise, INPUT will assume a standard format of:
 - IBM-PC.
 - PC-DOS 2.01.
 - 380 K.
 - dBASE III compatible file structure.

- INPUT can make the data available in nonstandard formats. Please call or write for a full listing of formats.
- Clients that do not wish to analyze the data themselves can utilize INPUT's Client Inquiry Service (Hotline) to access the data. The hotline staff work with the program consultants to provide additional information about this (and all other) INPUT reports.

APPENDIX F: DEFINITIONS

APPENDIX F: DEFINITIONS

- APPLICATION SOFTWARE - Software that performs processing to service user functions.
- CONSULTING - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.
- DISPATCHING - The process of allocating service resources to solve a support-related problem.
- DOCUMENTATION - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.
- END USER - May buy a system from the hardware supplier(s) and do his own programming, interfacing and installation. Alternatively, he may buy a turnkey system from a systems house or hardware integrator.
- ENGINEERING CHANGE NOTICE (ECN) - Product changes to improve the product after it has been released to production.
- ENGINEERING CHANGE ORDER (ECO) - The follow-up to ECNs which include parts and a bill of material to effect the change in hardware.

- ESCALATION - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.
- FIELD ENGINEER (FE) - For the purpose of this study, field engineer, customer engineer, serviceperson and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.
- HARDWARE INTEGRATOR - Develops system interface electronics and controllers for the CPU, sensors, peripherals and all other ancillary hardware components. He may also develop control system software in addition to installing the entire system at the end user site.
- LARGE SYSTEM - Refers to traditional mainframes including at the low end IBM 4300-like machines and at the high end IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of \$350,000 and higher.
- MEAN TIME BETWEEN FAILURES (MTBF) - The elapsed time between hardware failures on a device or a system.
- MEAN TIME TO REPAIR - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.
- MEAN TIME TO RESPOND - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.
- MINICOMPUTER - See Small System.
- OPERATING SYSTEM SOFTWARE (SYSTEMS SOFTWARE) - Software that enables the computer system to perform basic functions. System software,

for the purposes of this report, does not include utilities or program development tools.

- PERIPHERALS - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and are not generally included in other categories, such as terminals.
- PLANNING - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning, "installation" planning.
- PLUG-COMPATIBLE MAINFRAME (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.
- SMALL BUSINESS COMPUTER - For the purpose of this study, is a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations and offers business-oriented system software support.
- SMALL SYSTEM - Refers to traditional minicomputer and superminicomputer systems ranging from a small multiuser, 16-bit system at the low end to sophisticated 32-bit machine at the high end.
- SOFTWARE ENGINEER (SE) - The individual that responds (either on-site or via remote support) to a user's service call to repair or patch operating system and/or applications software.
- SOFTWARE PRODUCTS - Systems and applications packages, which are sold to computer users by equipment manufacturers, independent vendors and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

- SUPERMINICOMPUTER - See Small System.
- SYSTEM INTERRUPTION - Any system downtime requiring an Initial Program Load (IPL).
- SYSTEMS HOUSE - Integrates hardware and software into a total turnkey system to satisfy the data processing requirements of the end user. He may also develop system software products for license to end users.
- TRAINING - All audio, visual, and computer based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.
- TURNKEY SYSTEM - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

